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A.D. 1850 . . . . . . . . . N° 13,003.

# SPECIFICATION

OF

## WILLIAM CRANE WILKINS.

## VENTILATING APPARATUS, GAS BURNERS, AND LAMPS, GAS STOVES, AND HEATING APPARATUS; MANUFACTURE OF CANDLES.

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# Ventilating Apparatus, Gas Burners, &c.; Lamps, Gas Stoves, and Heating Apparatus; Manufacture of Candles.

## WILKINS' SPECIFICATION.

**TO ALL TO WHOM THESE PRESENTS SHALL COME,** I, William Crane Wilkins, of Long Acre, in the County of Middlesex, Engineer, send greeting.

**WHEREAS** Her present most Excellent Majesty Queen Victoria, by Her Royal Letters Patent under the Great Seal of Great Britain and Ireland, bearing date at Westminster, the Eleventh day of March, in the thirteenth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said William Crane Wilkins, my ex̃ors, adm̃ors, and assigns, Her especial license, full power, sole privilege and authority, that I, the said William Crane Wilkins, my ex̃ors, adm̃ors, and assigns, or such others as I, the said William Crane Wilkins, my ex̃ors, adm̃ors, and assigns, should at any time agree with, and no others, from time to time, and at all times during the continuance of the term therein expressed, should and lawfully might make, use, exercise, and vend, within England, Wales, and the Town of Berwick upon Tweed, and in the Islands of Jersey, Guernsey, Anderney, Sark, and Man, and in all Her Majesty's Colonies and Plantations abroad, my Invention of "Certain Improvements in Ventilating, Heating, and Lighting in Lamps and Candlesticks, in the Manufacture of Candles, and in the Apparatus to be used for such Purposes;" in which said Letters Patent there is contained a proviso obliging me, the said William Crane Wilkins, to cause a particular description of my said Invention, and in what manner the same is to be performed, by an instrument in writing, to be enrolled in Her said Majesty's High Court of Chancery within six months from the date of the said in part recited Letters Patent, as therein is more particularly stated.

**NOW KNOW YE**, that in compliance with the said proviso, I do hereby declare that the nature of my said Invention, and the manner in which the same is to be carried into effect, are fully described and ascertained in and by the following description thereof, reference being had to the Drawings hereto annexed, that is to say:—

My Invention consists, firstly, in improved ventilating apparatus to be applied to the windows, doors, chimnies, or other parts of buildings. Secondly, in the construction of gas burners and other gas apparatus, oil, spirit, vapour, and candle lamps, and apparatus employed for the purposes of artificial illumination. Thirdly, in the construction of gas stoves and other apparatus to be employed for the purpose of heating; and, fourthly, in an improved mode of manufacturing candles from tallow and other similar solid fatty materials.

I will now proceed to describe the improvements comprised under the first head of this my Specification:—Firstly, an improved ventilating apparatus adapted for ventilating apartments, and applied to form a communication from the interior of the apartment to the interior of the chimney. This should be placed in the upper part near the ceiling, and is intended to allow the vitiated and heated air to pass from the apartment to the chimney. This ventilator is represented in Sheet A of the accompanying Drawings; Figure 1 being a front view; Figure 2, a longitudinal section; and Figure 3, a transverse section. It is shewn adapted to the chimney of an apartment; *a*, *a*, the wall of the apartment; *b*, the apartment; *c*, the chimney. The cast iron or other metallic box *d* is fitted securely into the wall, the front of the box, which is nearly closed, having an opening *e* extending from end to end of the box, and passing in an inclined direction upwards, as shown in the transverse section, Figure 3; the inside of the front part of the box is of a curved form, corresponding in curvature to the periphery of the drum *f*, but not in contact therewith. This drum is mounted upon an axis which has its bearings in the two ends of the box, and thereby admits a rotary motion of the drum to take place; upon the periphery of the drum *f* a number of blades or floats *g*, *g*, are secured, which may be placed either radially with the centre of the axis or at an angle to a radial line. I prefer, however, to place them in an inclined position, as shown. The drum extends the whole length of the interior of the box, and has upon one end of it the toothed ratchet wheel *h*, into the teeth of which a click *i* takes, a small spring upon the back of the click maintaining it always in gear, by which means the drum can be rotated in one direction only, namely, in the direction shown by the arrow; the power necessary to rotate the drum is intended to be very slight, and is obtained from the tendency of the vitiated and heated air to pass into the chimney, which passing through the inclined opening *e* of the box strikes and presses against the floats *g*, *g*, in succession, and onward into the chimney *c*. A click prevents a current of wind or air in a downward direction rotating the drum in the reverse direction, and thereby passing through the ventilator into the apartment. Secondly, an improved ventilating apparatus applicable to the windows and other parts of apartments. Sheet A, Figure 4, represents a front view of a ventilator, and Figure 5 a section through the line 1, 1, of Figure 4; it may be applied to the window or to the door, or to any other part of an apartment for the purpose of ventilating it. The strips or narrow plates of glass *a*, *a*, have small metal frames *b*, *b*, attached to their ends, by which the glass strips are securely held; these frames have each two small studs or pins projecting from them in the direction of the length of the strips or plates *a*, *a*; these studs are received into holes in the vertical metal pieces *c*, *c*; these are connected together by the bars or connecting pieces *d*, *d*, which are jointed to them, and upon which they move, in construction exactly similar to an ordinary parallel rule; studs projecting from the inside of the frame *e*, *e*, pass through holes in the middle of the connecting pieces *d*, *d*, and upon which they move. It will be seen that the strips or plates of glass, whatever the extent of opening between them, will be in relative parallel positions, and by moving the vertical pieces *c*, *c*, up or down, the extent of opening between the strips or plates may be adjusted and regulated, or may be entirely closed when desirable. An improved construction of glass ventilator, adapted for ventilating apartments, is also shown in Figures 6 and 7, which represent, the one a front view, and the other a section; it consists of the frame *a*, *a*, the size or dimensions of which depend upon the size of the glass plates *b*, $b^1$, which are mounted within the frame *a*, *a*, by means of the smaller frames *c*, *c*, to each of which one of the plates of glass is fixed by one of its edges, projecting pins, or studs from the ends of the frames *c*, *c*, passing into holes in the sides of the frames *a*, *a*, by which means the plate *b* will be mounted upon the upper end of the frame *a*, *a*, and the plate $b^1$ upon the lower end of it; a sliding bar or plate *d* connects the two smaller frames *c*, *c*, so that movement given to one of them will communicate a corresponding movement to the other, which may be given by means of the cord *e* attached to the apparatus in a manner suitable for effecting that object. When the ventilator is closed, the glass plates *b*, $b^1$, will be close together, a portion of one overlapping a portion of the other, and as the ventilator is opened they will recede, the one in one direction, the other in the other, as shown by dotted lines; this is effected by pulling the cord in one or the other direction. My next improvement under this head consists of an improved construction of chimney ventilator or chimney top, which is to be placed on the upper end of a chimney for effecting the proper ventilation of the chimney, and is shewn in Sheet A. Figure 8 is an elevation, Figure 9 a vertical section, and Figure 10 a horizontal section. This chimney ventilator consists of two concentric cylinders *a* and *b* placed one within the other, and leaving an intervening space between them; these cylinders have vertical openings in them $a^1$, $a^1$, $a^1$, and $b^1$, $b^1$, $b^1$. The two cylinders are permanently fixed, and they are so placed in their relative positions that the openings in one of them are not opposite to the openings in the other; in the intervening space between the two cylinders is placed the semi-cylinder C, surmounted by the conical top and arrow; this is mounted upon a central rod attached to the semi-cylinder *b*, so as to turn with little friction, and which is effected by the action of the wind upon the arrow in the ordinary manner of moveable chimney tops; the convex side of the semi-cylinder is thus always presented to the wind, so that part of the ventilator will be closed, and the back or other part of it remaining open to permit the emission of the smoke and products of combustion from the chimney.

I will now proceed to describe my improvements under the second part of this my Specification, which relate to artificial illumination. The first consists in an improved construction of burner to be employed in the combustion of gas; the object which I propose to effect by this improvement is to allow a freer access or supply of air to the jets of gas as they issue from the burner, and thereby cause a more effectual and perfect combustion of the gas. With this view I form on the upper part of the burner a series of conical or other shaped projections (but I prefer the conical shape) *a*, *a*, above the surface of the upper part of it, and through the centre of each of these projections a small hole or perforation is made, through which the gas issues from the burner in the usual manner, and by this mode the air required for the due combustion of the gas is supplied more evenly to the jets of gas from the apertures. Another of my improvements consists in the mode of manufacturing gas burners. I form the upper part *b* of the burner of malleable iron, which being cast or otherwise made into the desired shape and form is turned up in the lathe, and otherwise finished in the ordinary manner; it is then coated or covered with tin or galvanized in the usual manner; the object of this process is to render the surface of the iron as little subject as possible to the corrosive and destroying action of the gas.

Sheet B, Fig. 11, an elevation; Fig. 12, a section; and Fig. 3, a plan of a gas burner; the lower edges of the upper part *b* of the burner are made of an inclined or dovetailed form, which when the upper part is to be affixed to the lower are then inserted in the recess previously formed in the lower part G; the metal of the one is then brought over the dovetails of the other by manipulation in the lathe, by which the connection of the two portions are securely effected; by this mode of manufacture and the employment of malleable cast iron therein gas burners may be manufactured considerably cheaper than hitherto, and will at the same time be more durable.

My next improvement is a mode of preventing any irregularity or oscillation of the flame from a gas burner produced from the too violent and sudden admission of air to the flame; this I effect by modifying and regulating the supply of air, by allowing it to pass in its passage to the flame through numerous small apertures. Sheet B, Fig. 14, is an elevation partly in section, and Fig. 15 a plan, partly in section, of a perforated disc or plate applied to a gas burner; the disc or plate *d* is closely perforated with numerous small holes, through which the air is admitted to the flame, whereby the air becomes very much divided, and after passing the perforations in the disc is not subject to be effected by the motion of the surrounding atmosphere; the disc is made with a rising portion forming the holder or support for the glass chimney. I prefer to make the disc of glass, porcelain, or other similar substance, but do not confine myself to the use of any particular material, so long as the same principle be employed.

My next improvement is a mode of preventing that peculiar noise commonly called in the trade "fizzing," frequently produced in fish-tail gas burners. I find that this peculiar effect is produced from the gas having a too free and direct passage to the burner. I therefore construct my burner so as to render the passage of the gas more tortuous, and thereby prevent this noise from occurring. I make this description of burners as shewn in Sheet B, Figure 16, which is a sectional elevation; the lower end of the stem *e*, through which the gas passes direct to the burner, when made in the usual manner, is in my improved burner plugged and closed up, the gas passing through lateral holes in the sides of the stem, hence to the burner; the pipe or socket into which the stem of the burner is screwed being made of increased diameter, and the stem projects into it, the gas passing up between the two and through the lateral holes in the stem; thus by the tortuous direction the gas takes in passing to the burner the said "fizzing" effect is prevented. Figure 17 represents a modification of the last-described burner, constructed in a similar manner to prevent the "fizzing," and likewise provided with a stem mounted vertically upon the top of the burner, which stem carries a circular conical reflector, by which the light from the flame is reflected around.

My next improvement consists in a method of effecting the combustion of the gas from the burner, and thereby producing a greater degree of illumination than by the ordinary methods; my apparatus for effecting this object is shewn in Sheet B, Figure 18, and consists of a semi-hollow or concave ring, which fits the outside of the burner to which it is applied. There are two interior edges to the ring, one of which *a* is plain, and the other *b* has upon it a series of curves or serrations, or otherwise is made irregular in such manner that when placed over the burner numerous spaces or apertures are formed between the ring and the burner, through which air passes to the flame; when this apparatus is placed upon the burner the plain edge is to be uppermost, and it is to be placed in such a relative position to the burner that that edge shall be a little space above the top of the burner. The air having passed through the apertures between the irregular edge of the ring, the burner will be deflected by the curved form of the hollow of the ring upon the jets of gas as they issue from the burner, thereby mixing with the gas more intimately and effectually than when supplied in the ordinary manner.

My next improvement consists in a method of increasing the extent of the flame from gas burners, and to increase its illuminating power. I effect this by the means represented in Sheet B, Figure 19, which consist of a curved ring, placing the cylindrical part *a* over the burner, the curved part *b* of the ring expanding from the burner, which has the effect of compelling the flame of gas to a great extent to take the curved form of the ring, which then becomes increased in extent.

My next improvements relate to the construction and mode of action of apparatus for regulating and equalizing the supply of gas to the burners. In the ordinary mode of constructing gas apparatus upon an increased pressure of the gas in the pipes taking place, a corresponding increase of the quantity supplied to the burner and its consumption occurs. My improvements are intended to obviate this result, and maintain an equal and uniform supply of gas to the burner under all degrees of pressure.

One of my improved regulators for effecting this object is shewn in Sheet B, Figure 20, which is a vertical section of it. The regulator consists of a valve *d* of the conical form, placed between the ends of the two tubes or apertures *a* and *b*, falling over the aperture *a*, and enclosed within the box *c*; the tubes, both *a* and *b*, have lateral apertures in them, through which the gas passes. When the pressure of the gas is moderate the valve *d* is maintained elevated just above the tube *a*, the supply of gas passing through the aperture *a*, past the valve *d*, and through the box *c* and the aperture *b* to the burner. Upon an increased pressure of the gas taking place the effect of it will be to act against the under side of the valve *d* as it passes from the aperture *a*, by which the valve will be raised, and partially close the aperture of the upper tube *b*, whereby less gas will be allowed to pass, but being of increased density, the flame will be maintained at a uniform degree; the greater the pressure of the gas the higher the valve will be raised, and the more the aperture *b* will be closed. Upon a decrease of the pressure taking place the valve will descend and permit a greater quantity to pass the tube or aperture *b* to the burner; the lateral apertures are for the purpose of allowing a small quantity of gas to pass should the mouths of the tubes be entirely closed.

Sheet B, Figure 20, represents another construction of apparatus for regulating the supply of gas to the burner; this regulator consists of a flexible and elastic disc *d*, stretched across and secured to the sides of the box *c*, and perforated with numerous holes through which the gas flows; upon the gas passing through the tube or aperture *a* with increased pressure it acts against the lower side of the flexible disc *d*, and causes it to assume a convex form towards the aperture or tube *b*, thus partially closing that aperture and permitting less gas to pass to the burner; upon the pressure of the gas being increased to its fullest extent, the aperture *d* will be entirely closed, and the only gas supplied to the burner will then pass through the lateral apertures.

Another arrangement of construction is represented at Sheet B, Figure 22. In this modification the regulator is formed of an elastic cap *d* (in form similar to that of an ordinary finger stall), which encloses the upper part of the tube *a*, but at a little distance from it is secured below to a ring or flange upon the bottom of the box *c*, through which ring apertures are made to allow the gas to pass into the box *c*; there is a ring secured to the sides of the box which encompasses the elastic cap, but not in contact with it; *b*, the aperture or tube through which gas passes to the burner. Upon an increase in the pressure of the gas taking place with this regulator, the gas flowing through the tube *a* into the interior of the elastic cap *d*, will expand it, by which the space between the exterior of the cap and the ring in the box will be contracted, and permit a less quantity of gas to pass to the burner. In some cases I apply a regulating valve or apparatus to stop-cocks for regulating the supply of gas to burners; by this combination the regulator is made applicable to a larger or smaller burner for regulating the supply of gas thereto. An adaptation of this improvement is represented in Sheet B, Figure 23rd. In the supply pipe *a*, immediately in front of the plug of the stop-cock, two apertures are formed for the passage of the gas, instead of one only in the other portions of the pipe, and immediately below these two apertures a bar is fixed in the pipe, through a hole in which passes the stem of a small valve *d*, under one of the two apertures; upon an increase in the pressure of the gas taking place when this apparatus is employed, the effect is to raise the small valve *d*, and partially close one of the apertures, by which the supply of gas will be diminished, and upon a very considerable increase of the pressure taking place, the valve will wholly close the aperture, but the other will be left entirely free; by this means a diminished quantity of gas will be supplied to the burner; the plug of the stop-cock is employed to regulate the supply as adapted for a larger or a smaller burner. A modified construction is shewn in Sheet B, Figure 24; in this the regulator is placed in the plug of the stop-cock, the supply pipes *a* and *b* being left entirely free; the valve is here dispensed with, the plug of the stop-cock being formed with two apertures, one of which is formed conical or taper, and contains loosely within it a small ball *d*, which, as the pressure of the gas is increased, rises in the conical opening of the plug, and according to that pressure partially or wholly closes that aperture, thereby diminishing in like proportion the quantity of gas supplied to the burner. Figure $24^a$ is another modified construction of regulator; the valve in this case is mounted upon a spindle between the ends of the two pipes *a* and *b*; the effect produced by an increase of pressure of the gas is the same as before described. These several regulating apparatus are applicable also for regulating and equalizing the passage of gas to gas meters. I will now describe my improvements in the construction of certain parts of gas fittings or apparatus, namely, the elongating or sliding pendents. A mode of construction is represented in Sheet B, Figure 25, which is an elevation partly in section of a pendent sliding gas lamp. These, when constructed in the usual manner, have the hydraulic or water joint at the lower end to prevent the escape of gas. My improvement is to dispense with the use of this hydraulic joint and effect the same object by the use of a tube formed of vulcanized india-rubber, or other similar elastic material. To the upper end of the inner tube *a* is attached one end of a tube or pipe *e* of vulcanized india-rubber, the other end being securely attached to the top of the outer tube or pendent; the junctions must be made in an air-tight manner. The elasticity of the vulcanized india-rubber tube allows the inner tube to slide upwards or downwards within the outer tube without allowing any escape of gas. In Figure 26 I have represented another arrangement of construction of pendent gas lamp. To the ceiling plate is attached the pendent tube *a*, upon two opposite sides of which are fixed the ratchet toothed racks *i*, *i*; over this rack tube is placed the sliding pendent tube, upon the lower end of which is secured the ornamental vase *d*, which contains the vulcanized india-rubber tube *c*, one end of which is secured to the lower end of the rack tube *a*, and the other end to the upper end of the tube *e*, fixed to the bottom of the vase, thus allowing the pendent tube *b*, and vase *d*, being raised or lowered at pleasure; upon the upper end of the pendent tube *b* is placed another ornamental cup *f*, containing the click apparatus for retaining the pendent tube at any required height, and which consists of a ring *g*, in the interior of which are two slots to pass over the teeth upon the tube *a*; to these rings the swivels *h*, *h*, which carry the clicks are attached. These clicks take into the teeth of the racks and hold it stationary at any desired height. I will now describe my several improvements in the arrangements and constructions of those description of lamps known as pressure lamps. Sheet C, Figure 27, represents in sectional elevation a pressure table lamp, in which the pressure or power required to elevate the oil to the burner is obtained from the gravity of a weight acting upon a flexible bag or vessel. When the lamp is to be supplied with oil it is poured into the cup *a*, when it flows into the space in the base *b*, above the plate *c*, and also into the pillar of the lamp *d*; the plate *c* is then supposed to be near the lower part of the base *b*, as represented; to the plate *c* is secured the lower edge of the bag or cylinder *e*, the upper edge being in like manner secured to a ring *f*, fixed to the upper part of the base. These joints are all made fluid and air tight; upon the plate *c* is placed a valve *g*; there are pins passing through the valve and screwed to the plate *c*, serving as guides to the motion of the valve; upon the valve is placed the weights *h*, *h*, which are suspended from the ends of the wire cords *i*, *i*; the upper ends of these cords pass over small pulleys *k*, *k*, and then to a rod or spindle *l*, around which they are wound; upon the outer end of this spindle is a small handle or button *m*, by which it may be turned; the spindle rollers are supported by a small frame attached to the oil cup *a*; when the oil is to be passed to the under side of the plate *c*, in the base of the lamp, nothing more is requisite than to turn the handle or button *m*, by which means the weights *h*, *h*, will be raised and the valve *g* will be lifted from its seat upon the plate *c*, when the oil will flow into the space below the plate *c*, and fill it; continued turning of the spindle *l* will raise the plate *c*, filling the space beneath it with oil; then upon the release of the spindle the weights *h*, *h*, will descend and carry with them the valve *g*, and close the aperture. The weights are of sufficient gravity to cause the plate *c* to descend and force the oil beneath it up the tube *n* to the burner *o*, keeping up a regular supply until it again reaches the lower part of the base. The flexible bag or cylinder *e* prevents any return of the oil and allows the plate to be elevated and lowered without friction; the upper end of the tube *n* is made fast by a nut to a spiral worm tube *p*, in the worm of which the cotton wick holder works; this tube is held stationary, and the burner and the cotton wick holder are made to move round it; when the wick is to be elevated or depressed, the overflow of oil from the burner flows down into the oil cup *a*, and thence passes into the interior of the pillar and base, to be again raised as before described. Fig. 28 represents a pressure oil lamp to be applied to the ordinary magnum candle lamp, into the cylinder or pillar of which the lower part of the pressure lamp is placed. The tube or cylinder *a* is of equal diameter throughout, and is fitted with the piston *c* in a fluid-tight manner; the oil supply tube *n* passes up the centre of the cylinder from the bottom of it to the burner; it passes through the piston *c* also in a fluid-tight manner. The piston *c* is connected by two wire cords *i*, *i*, with the spindle *l*, in manner as before described, and two other wire cords $i^1$, $i^1$, are connected from the lower side of the piston to fuzees or drums *f*, *f*, round which they are coiled; these fuzees or drums contain springs, which are the elevating or raising power to force the oil up the tube *n* to supply the burners. There are a ratchet wheel and clicks upon the axis of the fuzees, by which the tension and force of the springs at any time can be regulated and adjusted; the burner applied may be of the construction before described, or of any of the ordinary constructions; the action of the lamp is similar to that before described; by turning the spindle *l* the piston *c* will be raised, when the oil hitherto above the piston will pass through a small valve in the piston to beneath the piston; upon release of the spindle *l* the piston will be drawn downwards by the power of the springs in the fuzees, and the oil will be forced up the tube into the burner; in this and also in the before-described arrangement a wire is employed in the tubes *n* for the purpose of regulating the flow of oil through the tubes, and also to facilitate the cleansing of them. A modification of this last-described pressure lamp is shewn in Sheet C, Fig. 29, likewise adapted to be applied to magnum candle lamps; the principle of action in this modification is precisely similar to the arrangement last described; the tube *n* for carrying the oil up to the burner is placed outside of the tube or cylinder *a*, and one fuzee *f* only is employed.

My next improvements in lamps which I shall describe are in the arrangement and construction of lamps known as body lamps, and the first is represented in sheet C, Fig. 30, which shows a sectional elevation of a body lamp, and Fig. 31, a plan of burner and arrangement of construction, and mode of raising and lowering the wick. This lamp is supplied with double or two flat wicks, to both sides of which the air required for combustion is freely admitted. *a*, the reservoir to contain the oil, which has a burner *b* secured to the centre of it; the burner is adapted to take two flat cotton wicks, and is secured to the reservoir at opposite points, and through these parts a free passage is allowed for the oil to flow from the reservoir to the burner; a tube *c* is secured to the bottom of the burner, and it communicates with the parts of the burner containing the wicks. *d* is a tube with a spiral groove or thread upon its outer surface; the tube *d* is secured to the upper end of the wire rod *e*, which passes down the centre tube *c*, and carries a small worm wheel, which gears into and is worked by a worm upon the spindle *f*; the wick holder is acted upon by the spiral groove tube *a*, which being turned by the spindle *f*, the wicks may thus be raised or lowered at pleasure; a cone *g* is placed over the top of the burner, and this also if desired supports the glass chimney; the cone has two openings or slots, through which the flame from the burner passes; by this construction of lamp I obtain a free supply of air from beneath to all parts of the wicks, and also a good supply by means of the cone, and thus secure an effectual combustion of the material and the developement of high illuminating power. Another of my improvements in body lamps is represented in Sheet C, Fig. 32, which is a sectional elevation, and Fig. 33, a plan of a body lamp.

A, the reservoir to contain the oil; up the centre of the reservoir is secured a flat tube *c*, which at its lower end projects considerably below the bottom of the reservoir, and to its lower end is secured the stem B, by which it may be mounted upon any ordinary pillar or stand; within the flat tube *c* is contained a flat rod or tube *d*, capable of sliding up and down within the tube *c*, the upper end of this flat rod which projects above the top of the reservoir, and carries the two cones *o*, *o*, placed over the wicks, the cones having slots in them through which the flame passes. These cones are removeable at pleasure so as to enable the wicks to be replaced with facility; the lower part of the tube *c* has a slot in the two sides; upon one of these sides teeth are made forming a fixed rack, and into these teeth the teeth of a pinion *g* fixed upon the spindle *h* gear, the bearings of the spindle being in projections from the flat rod *d*, and therefore moving with it; thus by turning the spindle *h*, the flat rod *d*, and the attached cones *o*, *o*, may be raised or lowered so as to increase or diminish the size of the flames. Sheet D, Fig. 34, represents a plan view of a body lamp arranged with four flat wicks, each wick provided with its separate and distinct reservoir for containing the oil; the construction is precisely similar to that shewn in Figures 30 and 31, and previously described, but differing only in the number of wicks.

My next improvement relates to the construction of lamps applicable to railway carriages; this lamp is represented in Sheet D, Fig. 35, which is a vertical section of the lamp: *a*, the reservoir for containing the oil; *b*, *b*, the burners; *c*, a rod or stem which passes down through the centre of the reservoir. The lower end carries upon it a leather washer or piston which fits in a fluid-tight manner the lower and cylindrical part of the reservoir, so that when the washer is raised above the openings of the tubes leading to the burners, oil will be prevented from flowing to the burners. Under the washer is placed a spiral spring, the tendency of the elastic action of which is to raise the washer and close the communication; *d*, the tube by which the reservoir is supplied with oil; *e* is a cap with only half a rim to it, and is provided with a leather washer upon its under side for the purpose of making an air-tight joint with the upper edge of the filling tube *d*; *f* is a screw jointed to the upper side of the cap *e*; the screw works in the end of the lever *g*, which swivels upon the stud *h*. When the reservoir is to be supplied with oil the screw *f* is unscrewed; this lifts the cap *e* off the top of the filling tube *d*, then moving round the lever *g*, the cap is moved on one side; the rod *c* being thus set at liberty, the spring at its lower end will elevate the washer, and stop the flow of the oil to the burner; when the cap is rescrewed, the rod *e* will be depressed, and the passages to the burners opened.

Another construction of railway lamp is represented in Fig. 36, which is a vertical section of a single burner lamp for the roof of a railway carriage. My improvement in this lamp is the mode of supplying the oil to the reservoir of the lamp; the oil is supplied from the reservoir to the burner in the usual manner through the lower valve. The rod or spindle *a* which carries the valve *b* has also another valve *c* attached to it near its upper end and opening from its seat in the opposite direction to that of the lower valve *b*, so that only one of them can be opened at the same time. When it is required to supply oil to the reservoir of the lamp, all that is required is to press down the rod, whereby the lower valve will be closed upon its seat and the upper one opened. This prevents any oil from passing from the reservoir to the burner, while the opening of the upper valve permits the oil to be poured into the reservoir; the small spiral spring above the upper valve at other times keeps the rod raised, and when the upper valve will be closed, and the lower one opened, when the oil will be supplied to the burner in the usual manner. Sheet D, Fig. 37, represents a plan view of a flat wick burner which approaches to the circular figure; the flat wicks are inserted in the spaces *a*, *a*, of the burner, and the wick holder is of similar construction to those employed in Figures 30, 31, and also in Figure 34.

My next improvement consists in an improved construction of bracket oil lamps, the principal feature of which is the employment of a curved wick holder and air tube, the cotton wick likewise assuming a corresponding curved form; this lamp is represented in Sheet E, Figure 38, which is a vertical section of the lamp in the form of a plain bracket secured against a wall; the body of the lamp is shewn composed of a metal tube *a*, bent into the curved form represented, and it also forms in itself the reservoir for the oil; the outer end where the burner is placed is in curvature a portion of the circle; the air tube *b* is also bent or formed of a curvature agreeing to that part of the tube *a* in which it is placed; the lower end at the oil cup *c* is connected to the lamp tube in a fluid-tight manner, and the oil cup *c* is screwed on in the usual manner; the wick holder, which, with the wick upon it traverses the curved air tube *b*, is likewise of a curvature agreeing to that of the air tube; the wick holder and the wick upon it do not revolve upon the air tube, but simply traverse up or down it in the following manner; to the upper part of the wick holder is fixed the end of the light steel rod or spring *d*, the other end of which is made fast to the toothed rack *e*; a small toothed pinion upon the spindle of the milled nut *f* takes into the teeth of the rack, and thus it is moved as desired; there is a small roller *g* placed under the rack *e* for maintaining the teeth of the rack always in gear with the pinion; thus by means of the milled nut the wick in the burner may be adjusted as required; there is a curved ring of metal *i* placed at the burner for the purpose of guiding and keeping the wick in its proper situation; a perforated cone *h* is placed over the burner for the purpose of perfecting the combustion; the lightness and elasticity of the steel spring *d* is such as readily to adjust itself to the altering position of the wick holder.

At Fig. 39, I have shewn a modified arrangement of burners; the curved ring *i* for guiding the cotton wick is here dispensed with, and a solid piece of metal *i* is placed in the burner for effecting the like object; the other parts of this Figure are arranged and constructed as before described. I sometimes employ the means represented in Fig. 40 for adjusting the position of the cotton wick. I in this case employ a very quick screw or thread for this purpose, by which any alteration of the wick by reason of the reaction of the steel spring *d* when bent is prevented. The spring *d* is secured to the piece *k*. It passes up through a slot in the lamp tube *a*, and through the upper end of it works the quick thread screw *l*, which being moved by the milled nut *n*, traverses the cotton holder and adjusts the wick as required. That in Fig. 41 represents an elevation, and Fig. 42 a plan, of an improved lamp head; in the proposed head I arrange three or other convenient and desirable number of reservoirs or receptacles for the oil around one burner, which may be of any of the usual constructions. I have shewn the adaptation of three of these cups or reservoirs *a*, *a*, *a*, to one burner *b*, to which the oil is supplied from all of them; the object to be attained in this construction is the production of less surrounding shadow. I will now proceed to describe my several improvements in spirit and vapour lamps: the first of these is represented in Sheet D, Figure 43, which is a sectional elevation of the head of a spirit vapour lamp; in this lamp the flame is produced by the combustion of vapour generated from spirit supplied by capillary power from the reservoir below to the burner above; the burner consists of a straight tube *a* placed over another tube *b*, into which latter the cotton wick is placed; the tube *b* is screwed into the top of the reservoir, and the lower end of the tube with the cotton wick passes into the spirit in the reservoir; the upper part of the burner or tube *a* contains in it two chambers or compartments, the lower of which *e*, which is closed. The upper end of the cotton wick is open to it by several small perforations through the cotton of the chamber; the upper chamber *a* communicates with the lower one *d* by means of one central conical or taper perforation only; a screwed taper wire or pin *g* passes through the top *f* of the burner, so that when screwed down the lower end of it, which is of a corresponding taper to that of the aperture, passes into that aperture, and partially or virtually closing it, adjusts and regulates the quantity of vapour passing through, or shuts it off entirely. Air is allowed to pass between the screwed pin or wire *g* and the hole in the top of the burner for mixing with the vapour previous to combustion.

Figure 44 represents a form and construction of vase or reservoir for spirit applicable to spirit vapour lamps; the peculiarity of this is the admission of a current or body of atmospheric air to pass between the stem *a* and the spirit reservoir *b*.

My next improved spirit lamp is represented in Sheet D: Figures 4, 5, a section, and Fig. 46, a plan: *a*, the reservoir containing the spirit; *b*, *b*, are two burners, in which the usual capillary wicks are placed; they are flat wicks, and seen best in plan, Figure 46. *c* is a flat metal stem, having a toothed rack formed upon one of its edges; it is fixed to the top of the reservoir. Between the two wicks *d* is a flat tube, which passes over the stem *c*, and carries upon its upper end a flat disc or a cone *e*, in which is a slot for each of the burners; the flat tube carries on one side of it a small pinion gearing into the rack upon the stem *c*; the milled nut *k* of the pinion can be turned, and the disc or cone *e* raised or lowered for increasing or diminishing the extent of the flame as desired.

My improved mode of constructing signal lamps is shewn in Sheet D, Figure 47, which lamp is capable of being made to shew different colored lights at pleasure: *a*, the burner, which may be of any ordinary construction. The cylindrical glass chimney *b* is attached to apparatus by which it can be raised or lowered at pleasure; it is divided in the direction of its length into divisions which are of different colors, as shewn, and by the raising and lowering apparatus any one of these colors may be brought to surround the burner and thereby shew a light of that color. The glass glove *c* may be filled with any colored liquid when a permanent light of that color is required to be exhibited, and should the light be required to be given in one direction only, then the opposite part or back of the globe may be silvered for the purpose in increasing the intensity of the light in the direction required. I will now describe my improved mode of carrying off the products of combustion from gas burners, and preventing any current backward to the burner, and thereby effecting the steadiness of the flame. This improvement is represented in Sheet Figure 48, which is an elevation of the syphon apparatus employed: *a*, a glass vase, within which is placed the gas burner *b*; *c*, a cover, fitting closely upon the top of the vase *a*; *d*, the syphon pipe from the vase cover *c*, passing to the chimney *e*, by which the products of combustion are carried off. The end *h* of the syphon pipe dips into the water contained in the vessel or cistern *i*, which is maintained at a proper level by any convenient means. There is a small branch pipe *k* passing downwards from the top of the syphon pipe in the chimney *e*, through which a portion of the products of combustion passes; thus it will be seen that the products of combustion pass through the syphon pipe and down the leg *h* of that pipe, pass through the water in the cistern *i*, and any downward current of air in the chimney *e* is prevented by the water from entering the syphon pipe, and passing hence to the burner would effect its steadiness.

I will now describe my several improvements in the construction of candle lamps and candlesticks or holders. That shewn by Figure 49 represents a mode of combining and burning in one lamp or holder three ordinary sized candles, by which a better and more convenient light is obtained than where a single candle of dimensions equivalent to three candles is employed: *a*, a central rod or stem, secured at its lower end to the cup *b*, in which three apertures are made, each of them of a size suitable to receive the spring candle tubes *c*, *c*, *c*, which being placed in the apertures rest upon the cup *b*, which, in addition to being supported of the tubes, form a grease cup for receiving any overflow of grease from the candles. The stem *a* is carried upward, and carries at its upper end a ring supporting the glass shade, as shewn; the combination is adapted for being placed in an ordinary magnum candle lamp, but it may be employed independently of that by continuing the stem downward and terminating it in a suitable foot or stand. Figure 50 represents my improved candle lamp. I make the candle tube *a*, in which the candle *b* is placed, of a curved form, which may be either a regular portion of a circle or may be of irregular degrees of curvation, as desired. The candle when pressed into the tube, by reason of its yielding nature, readily takes the form of the tube. But should the size of the candles, or the materials of which they are composed, or the curvature of the tube be such as to render it difficult to place the candle within the tube, then the candles may be found in joints or lengths, or manufactured of a curved form, so as to facilitate their entrance into the tube. The spiral spring is of the ordinary description, and I place a ball *c* as an intervening object between the spring and the end of the candle, that being better adapted than any other form for traversing the curve of the tube *a*. The plate *a* is attached to the wall, and the tube *a* may be attached to that by a socket, or in any convenient manner, so as to be removed and replaced with facility.

Figure 51 represents a mortar lamp. *a, a,* is the pillar of the lamp; it is made hollow for the purpose of admitting the atmospheric air through it to the interior of the wick. The pillar is secured to a hollow foot or stand containing a grease cup for receiving any grease flowing downward from the head of the lamp, and the upper end of the pillar carries the smaller piece of tube *b*, which passes into the interior of the wick. *c* is an outer tube which is passed over the pillar or tube *a*, and upon the top of this outer tube is the mortar head *d*. There is a spiral groove in the pillar at *e* into which a stud fixed into the outer tube *c* takes, so that by moving round the outer tube the mortar head may be raised or lowered and more or less of the wick exposed. The mortar head *d* consists of a circular shallow box covered by the moveable cover *f*, and the centre of the cover is occupied by a cone, through an aperture in which the flame from the burner passes. There are a number of apertures in the cover *f* of the mortar head, as shewn in Figure 52, a place through which the air passes to the outer part of the wick. The mortars may be made with hollow wicks, which when placed in the head pass over the small piece of tube upon the top of the pillar *a*. The mortars may, if desired, be made without the wicks, which then would be provided separately, and first placed upon a short piece of tube in the mortar head, and the mortar is then placed on the head; they might then be made of one piece or in segments, as shewn in Figure 53. Figure 54 represents small rings of tallow, which are placed in the cone over the burner when it is to be lighted, for the purpose of supplying liquid tallow to the burner previous to the liquification of the surface of the mortar itself. Figure 55 represents a modification of the mortar head, and consists in emptying several smaller heads or boxes *a, a, a,* arranged around the burner *b*; there being a connection between them, the fluid tallow will pass from the heads *a, a,* to the centre head or burner *b*. Figure 56 represents an ordinary spring candlestick provided with a self-acting extinguishing apparatus. Upon one side of the tube *c* is a slit from the top to nearly the bottom of it; in the interior of the tube is the usual spring to force up the candle. *d* is a stem projecting through the slit and secured to the nozzle in the tube at the bottom of the candle upon the outer end of the stem. *d* is a square hole through which the upright stem *f* passes, and is retained at any point by a set screw; it has an index marked upon it. *h* is the extinguisher placed on a joint secured on the top of the cap; there is a spring clip *i* upon the back of the joint. When the extinguisher is pulled back the clip falls over the ledge *k*. As the stem *d* is raised by the burning of the candle, the stem *f* will come in contact with the spring clip *i* and release it, when the extinguisher will be forced over the flame of the candle. The stem *f* may be set according to the time the candle is required to burn. Figure 57 represents an improvement in ordinary candlesticks by which the end of the candle will be held firmly until the whole of the tallow or other material used is consumed. *a* is a small metal plate in halves, a notch being made in the centre in which the wick of the candle is held. *b*, *b*, are springs rivited to the plate and to the socket of the candlestick. When the socket is drawn down into the candlestick the two half plates will be brought together, thereby holding the wick firmly between in the notch between them. Figure 58 represents a modification of the above adapted to spring candle lamps. The springs which carry the plate *a* are secured to a pin passing through the socket against which the spiral spring of the lamp presses. When the candle is placed in the lamp a wedge-like action takes place, and the end of the wick is firmly held in the notch in the plate. Figure 59 represents a spring candlestick adapted to indicate the length of time that has expired since the candle was lit. The spring and other parts of the candlestick are of the usual construction, but in the lower part of it is placed a small horizontal axis, which has upon it, outside the candlestick, an index hand or point, and affixed to the side of the candlestick is a face plate, graduated to shew certain lengths of time between the graduations that the candle has been burning upon the axis; but inside the candlestick is placed a small drum or pully, upon which is coiled a small cord, the other end of the cord being fixed to the under side of the socket in the candlestick, as shewn in the Figure. When a whole candle is placed in the candlestick and the socket is at the bottom the cord will be wound upon the drum or pully and the indicator hand will point to *o* or zero on the face; then, as the candle burns, the socket will rise and the indicator hand moved round, denoting the time the candle has been burning.

I will now describe my improved methods of illuminating by means of gas marine floating buoys or floats, for the purpose of rendering them sufficiently visible at night to serve as guides to ships and other vessels. I carry this into effect by enclosing within the hollow buoys or floating body flexible cases or bags, which are to be filled or charged from time to time with gas. The buoy or floating body is surmounted with a lanthorn or lamp provided with a burner or burners, which communicate by means of suitable tubes and pipes with the flexible bag or bags contained within the buoy or floating body, and whereby the burners will be supplied with gas, mechanical means being employed to regulate the supply from the flexible bags.

My improvements in the construction of reflectors generally applied for the purposes of illumination consist in coating or covering suitably shaped metal surfaces with silver lustre, either white or of various colors, so that thereby various and corresponding colored lights may be shewn and exhibited, these silvered and lustred surfaces being subsequently covered or coated with glass or some vitrified substance which is caused to adhere to the metal.

My last improvement under this head consists in burning hydrocarbons in contact with oil flames. I will now proceed to describe the improvements comprised under the third part of this my Specification, which relate to the construction of portable and other stoves to be heated by means of the combustion of gas or oil therein. In Sheet A, Figure 60, is represented the first of my improvements under this head, being a sectional elevation of a heating stove shown to be heated by means of an oil lamp; but gas burners may, however, be adapted for effecting the same object; the top of the metal chimney *a* above the ordinary glass chimney *b* is surmounted by a dome or bell trap *c*, by which the currents of warm air are deflected down to the water contained in the top of the stove preparatory to their passing through the perforations in the upper plate. By this means they are supplied with moisture previous to passing into the apartment. I adapt to this stove a system of reflectors, by which, at the same time that the apartment is being heated, I am enabled to obtain a considerable quantity of light generally in the apartment, and also to concentrate it to any desired point, as for example, upon a book or paper which a person sitting near the stove may be reading; the flame of the lamp being placed in the focus of the reflector 1, the light will be reflected to reflector 2, and forward to reflector 3, hence on to the book or paper. The reflectors 2 and 3 may be mounted upon arms or rods projecting from any convenient part of the stove.

Figure 61 represents a modification of the above-described stove. In this arrangement two gas burners are shown adapted in place of the one oil lamp shewn in the Figure 60. The working of the stove will be the same as the above.

My improvements under the fourth head relate to the manufacture of candles from tallow, and other like fatty matters. My improved process is as follows:—The tallow or other fatty matter is to be rolled or formed into sheets of the required thickness by the aid of suitable machinery; it is then to be rolled up into cylindrical candles, the wicks being caused to occupy the centre of the mass of materials; they are then to be placed in half moulds mounted upon

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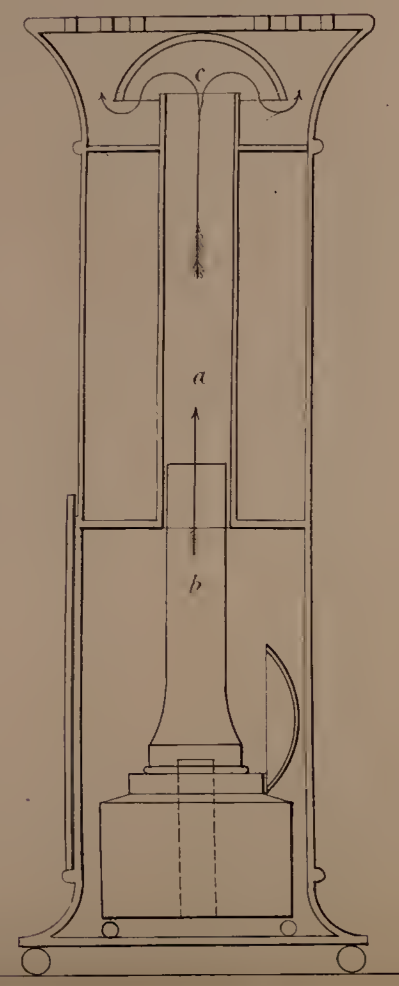
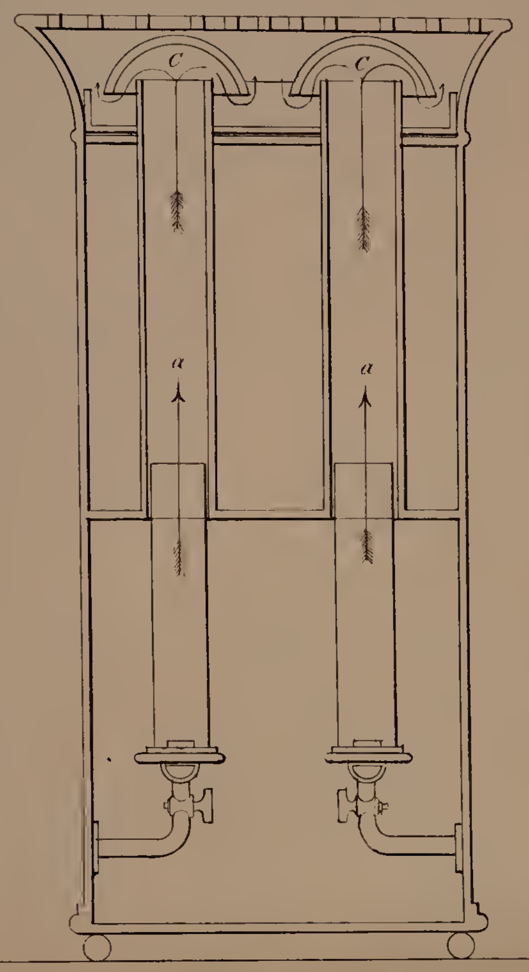
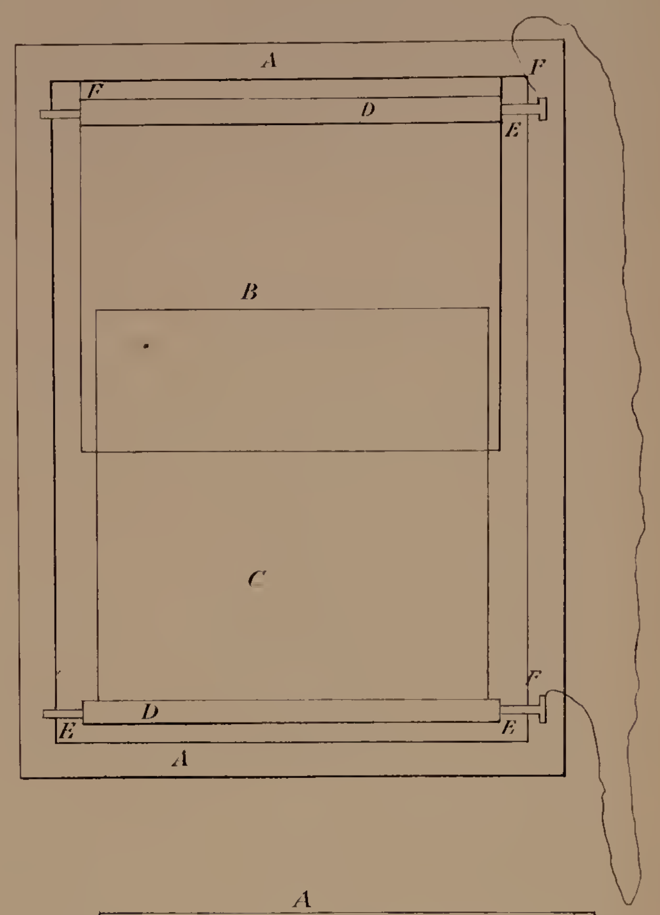
WILKINS' Specification.

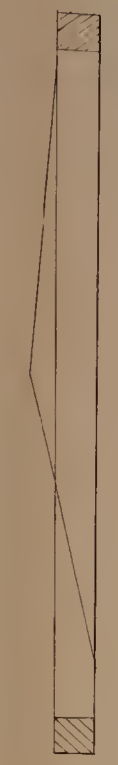
(5 SHEETS)
SHEET A

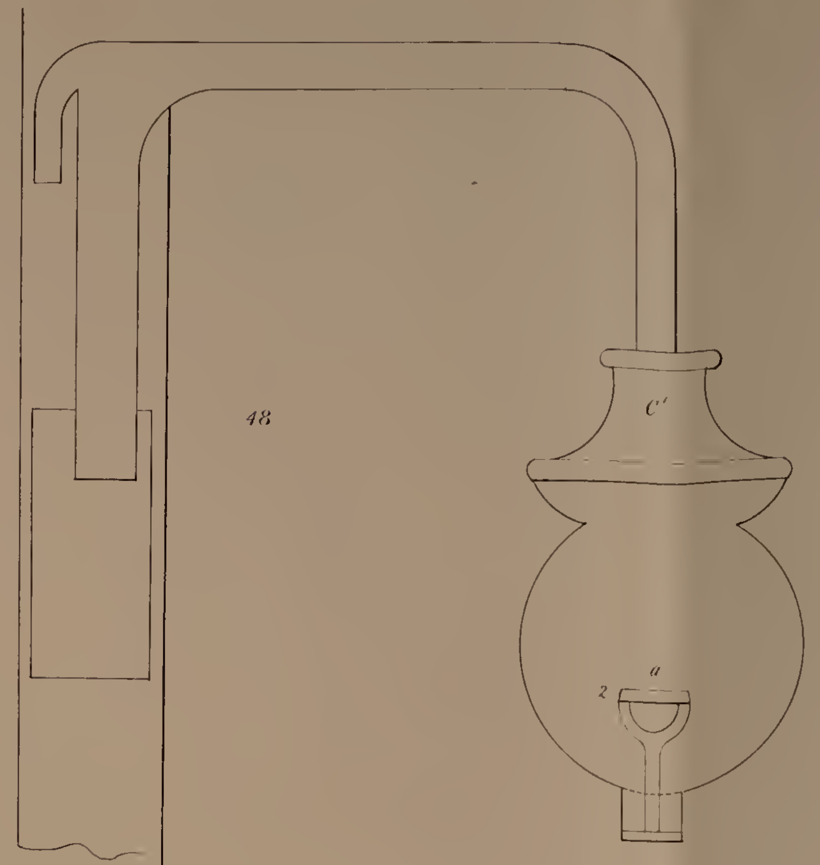
FIG. 60.

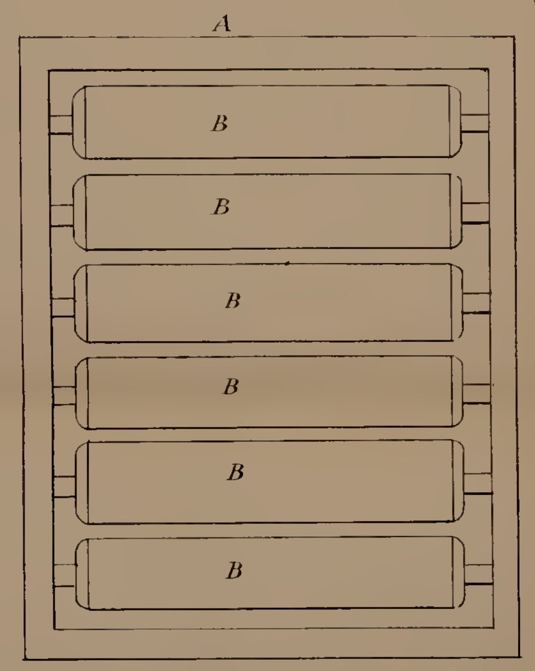


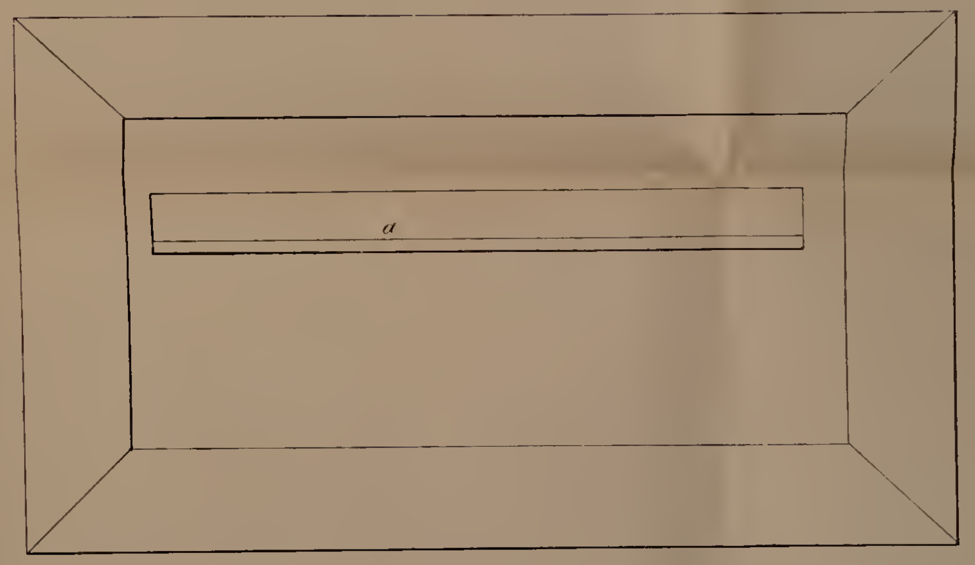


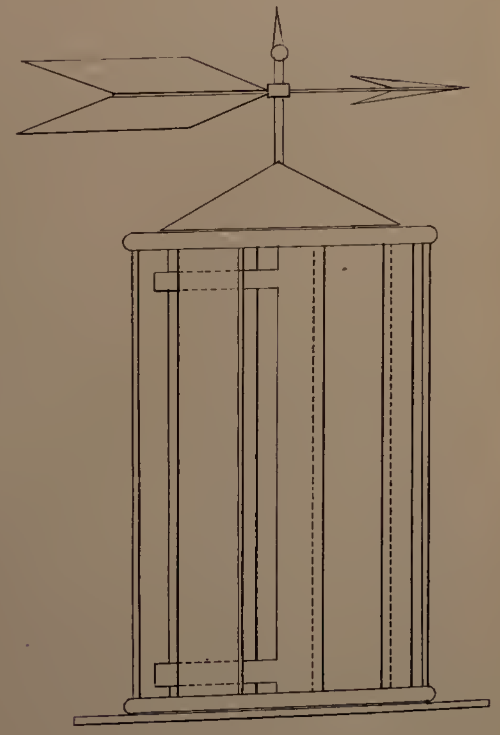


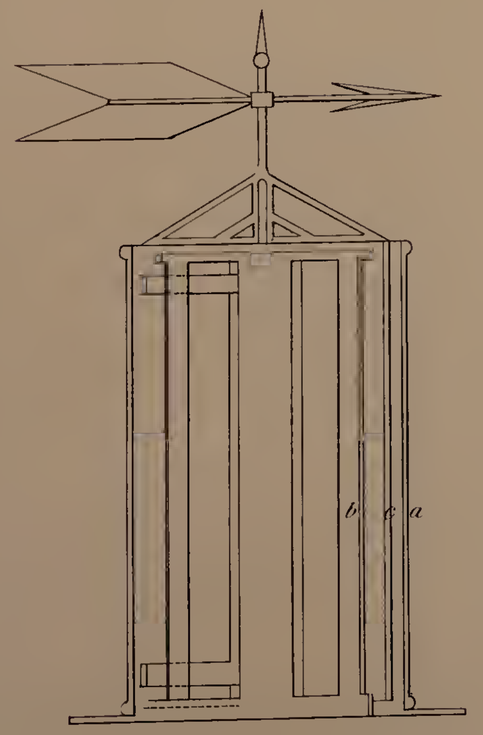


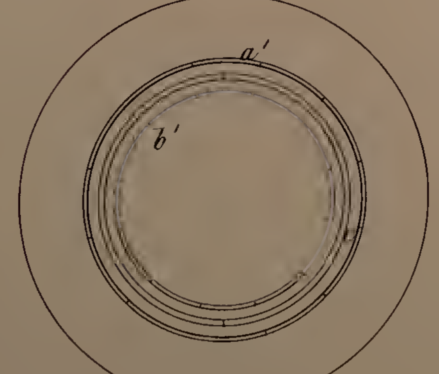


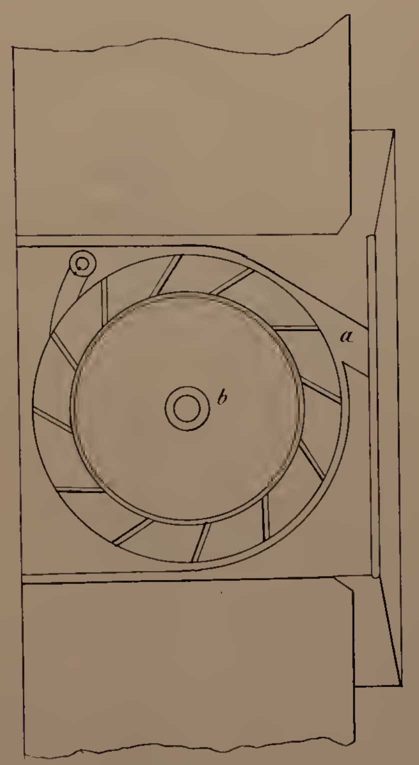


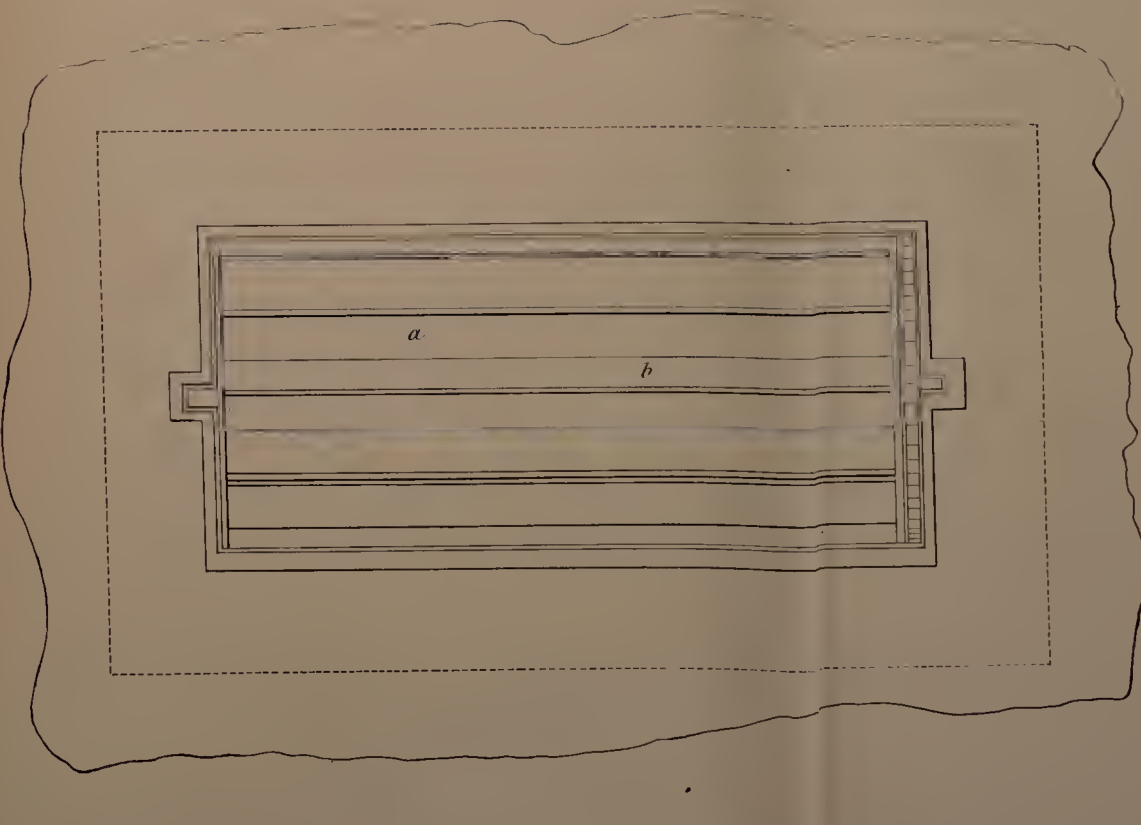












*The enrolled drawing is partly colored.*

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(5 SHEETS.)
SHEET B.

FIG. 14.

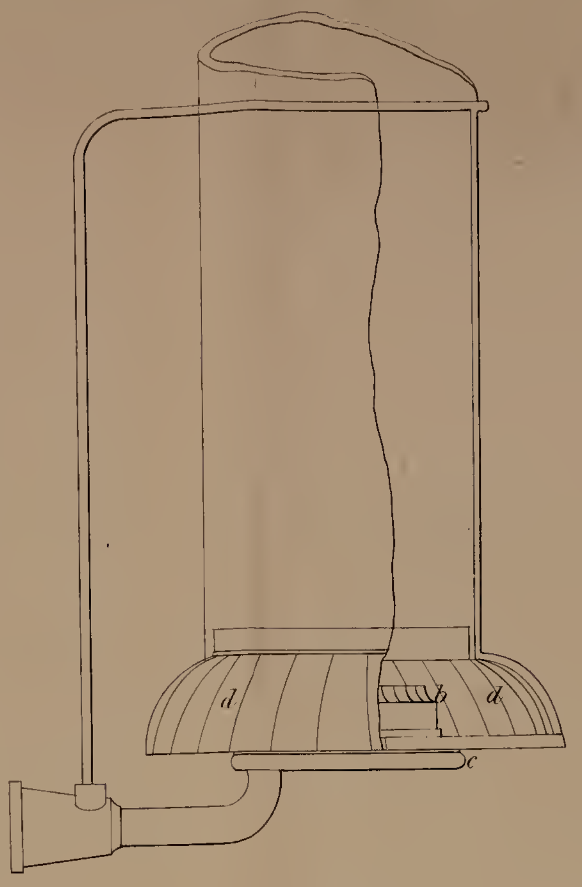


FIG. 11.

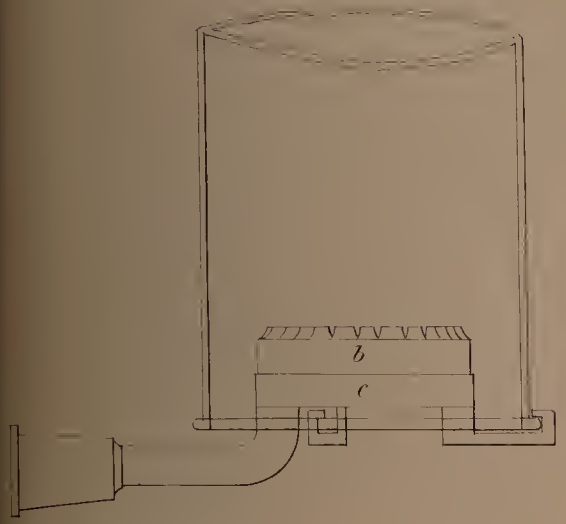


FIG. 12.

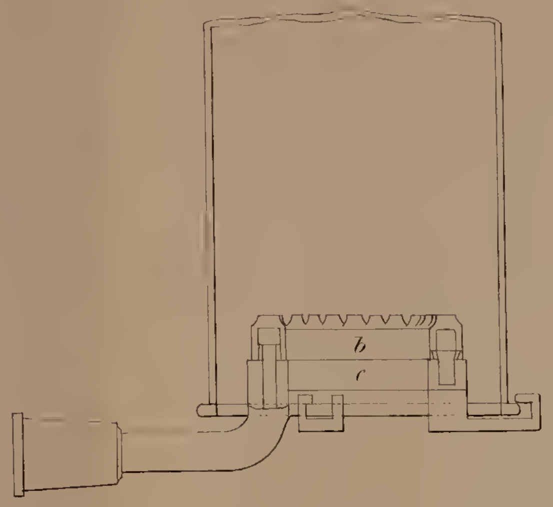


FIG. 25.

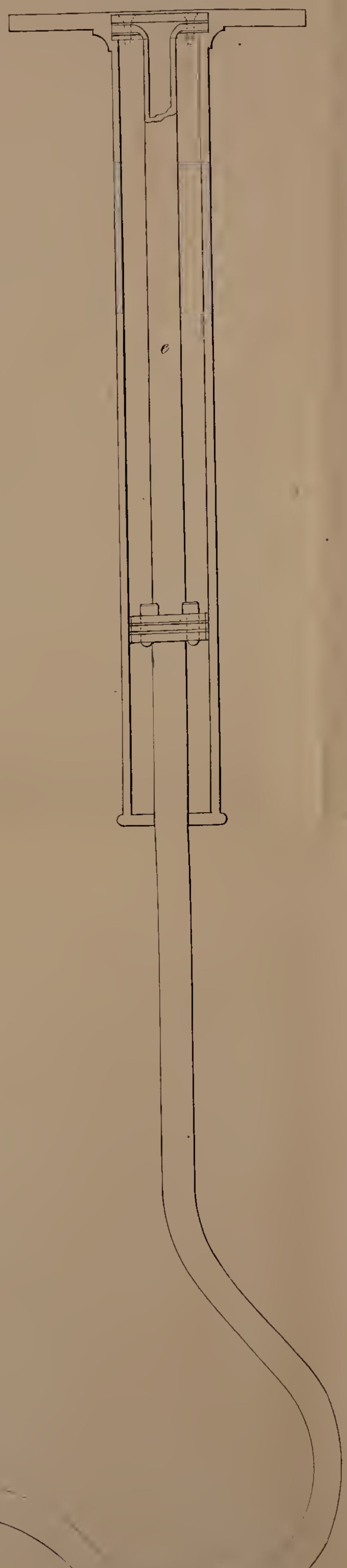


FIG. 26.

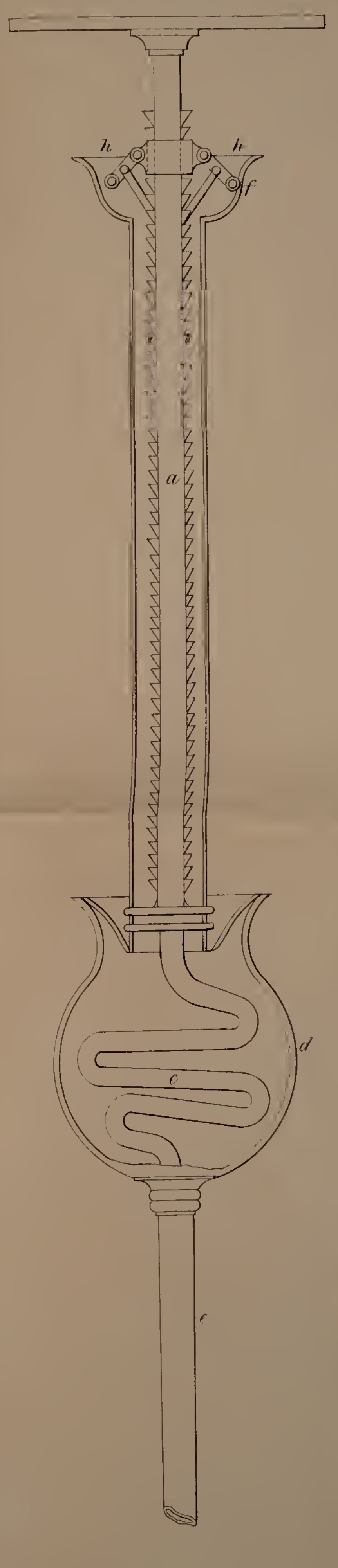


FIG. 13.

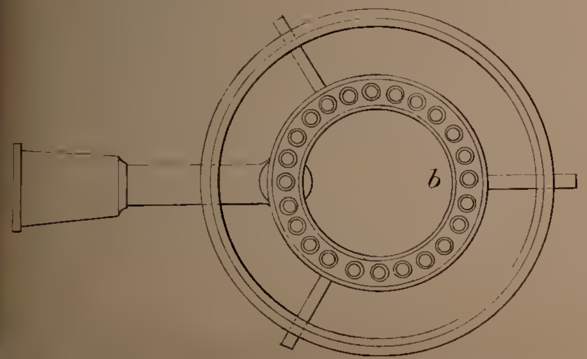
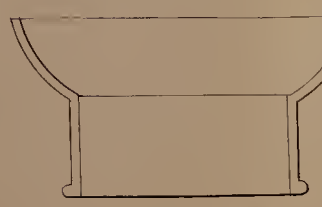


FIG. 19.



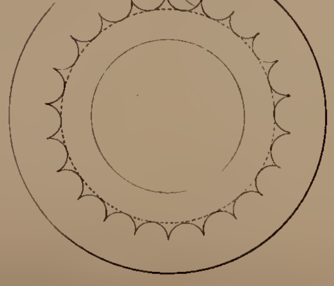


FIG. 15.

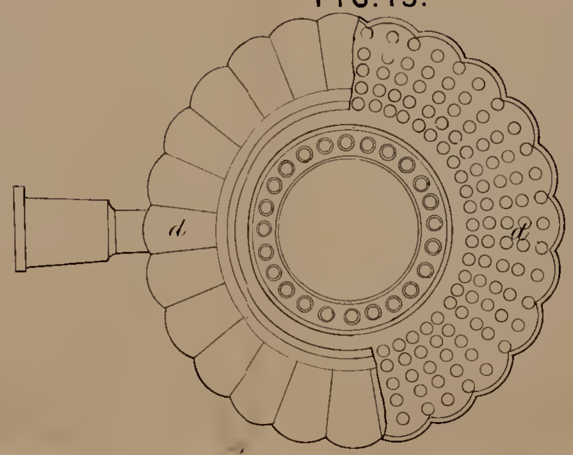


FIG. 18.

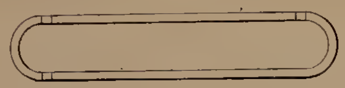


FIG. 17.

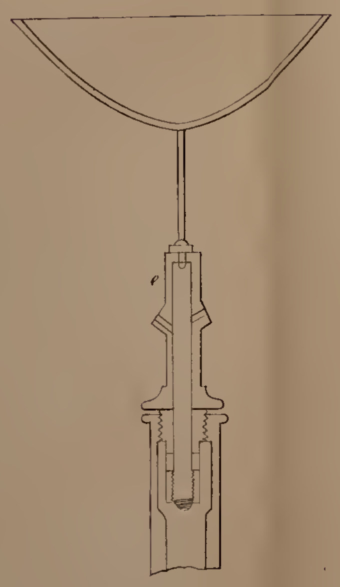
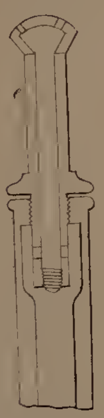
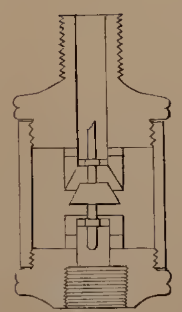


FIG. 16.





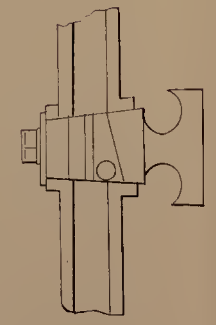


FIG. 20.

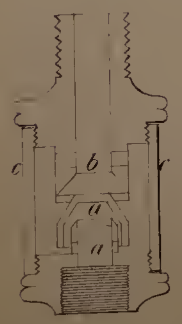
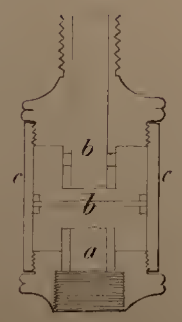
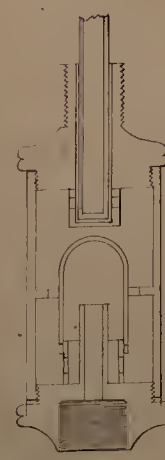
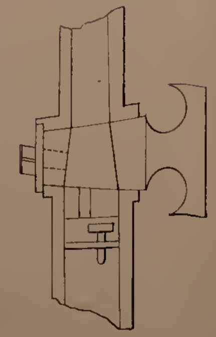


FIG. 21.







The enrolled drawing is partly colored

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A. D. 1850, March 11. Nº 13,003.
WILKINS' SPECIFICATION.

(5 SHEETS)
SHEET C

FIG. 27.

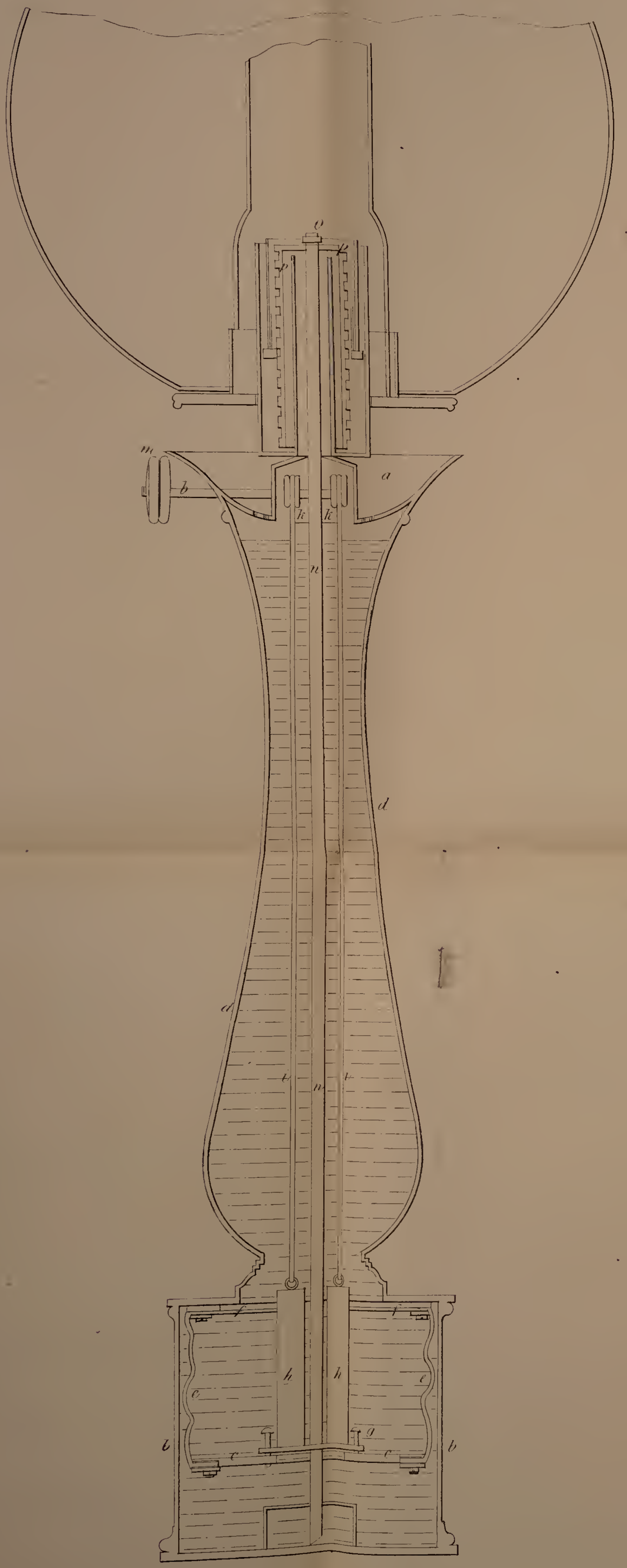


FIG. 28.

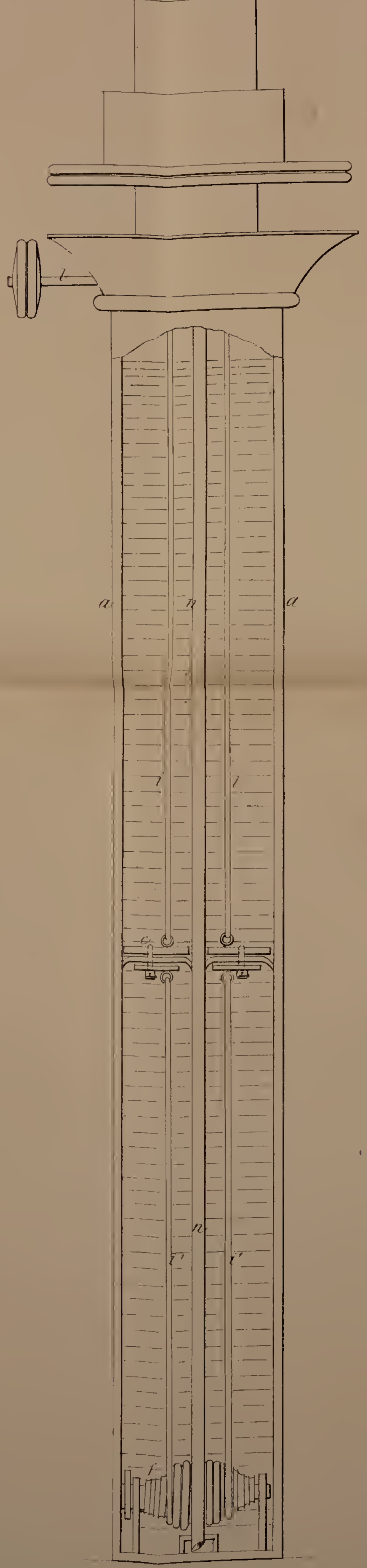


FIG. 29.

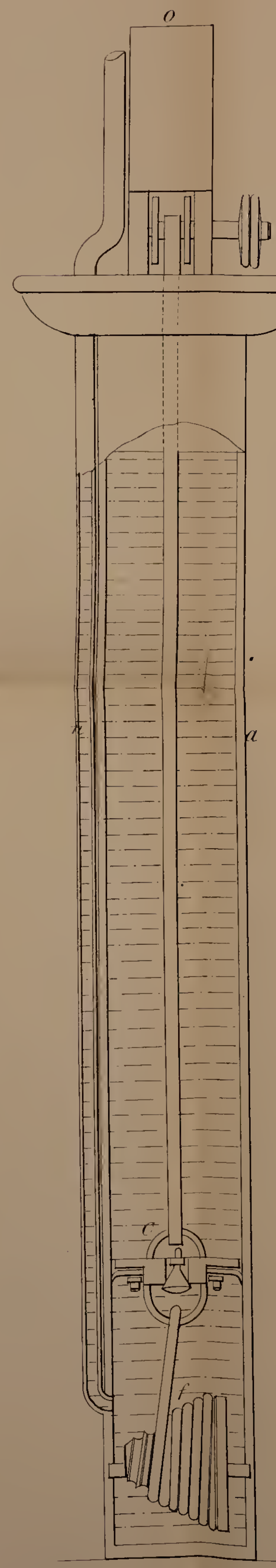


FIG. 30.

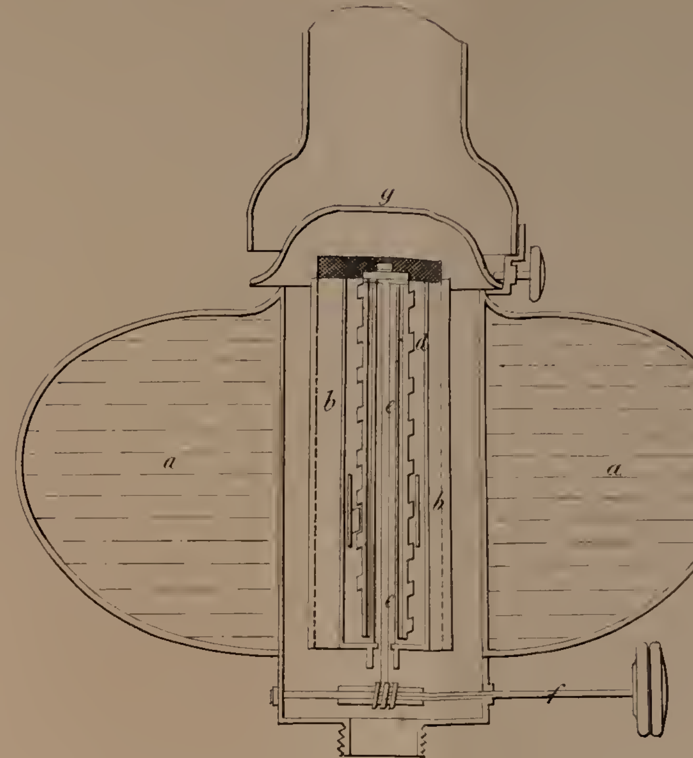


FIG. 31.

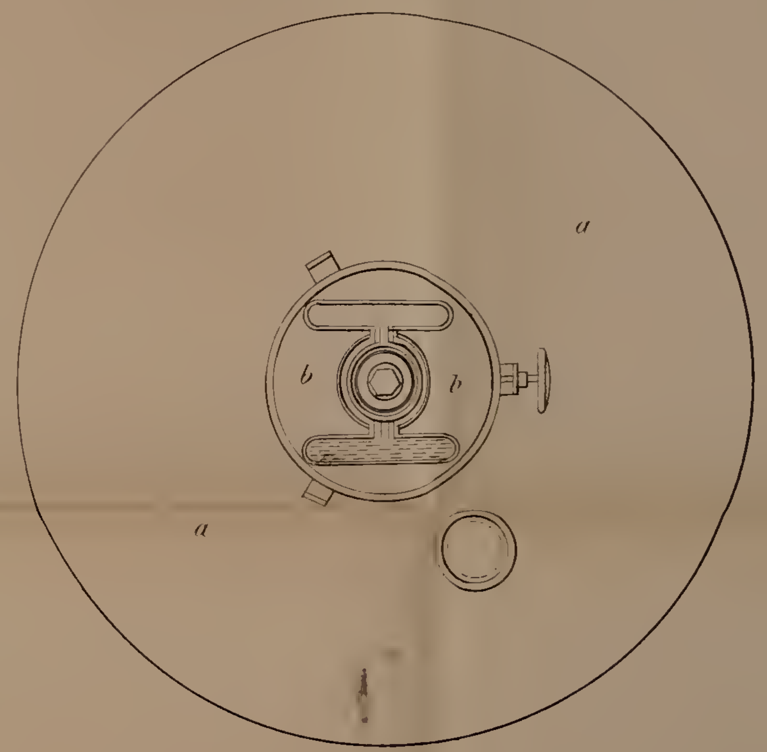


FIG. 32.

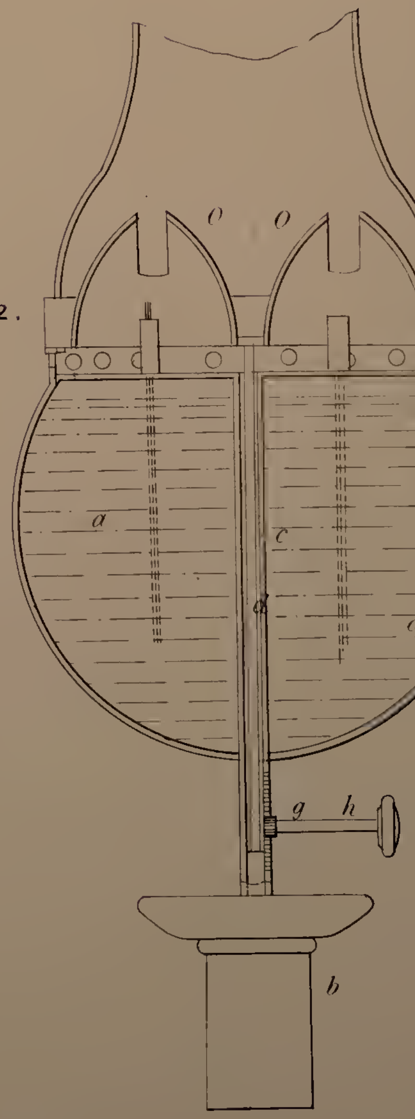
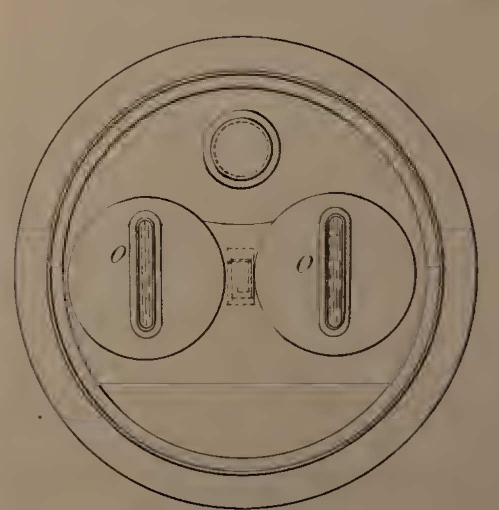


FIG. 33.



*The enrolled drawing is partly colored.*

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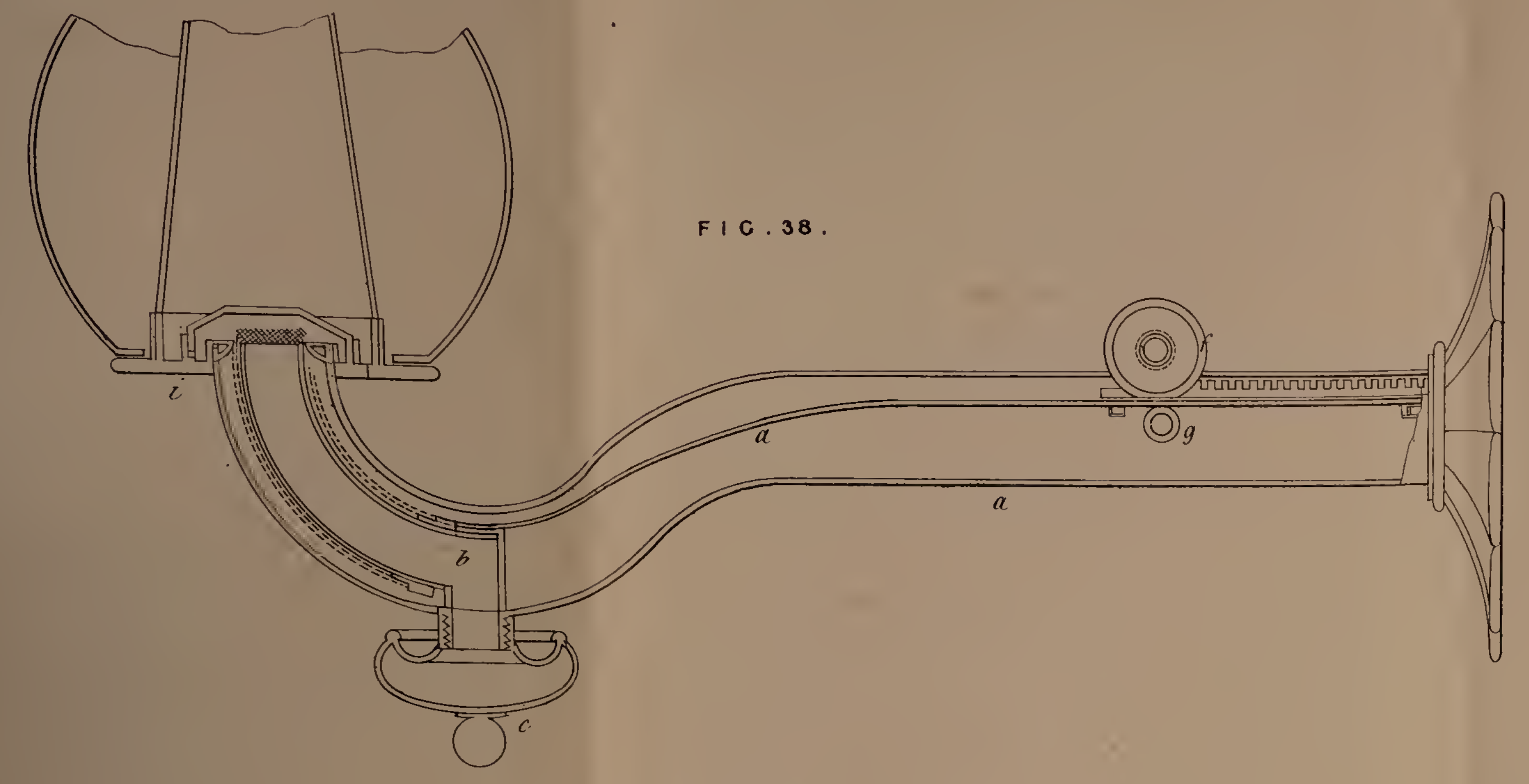


FIG. 38.

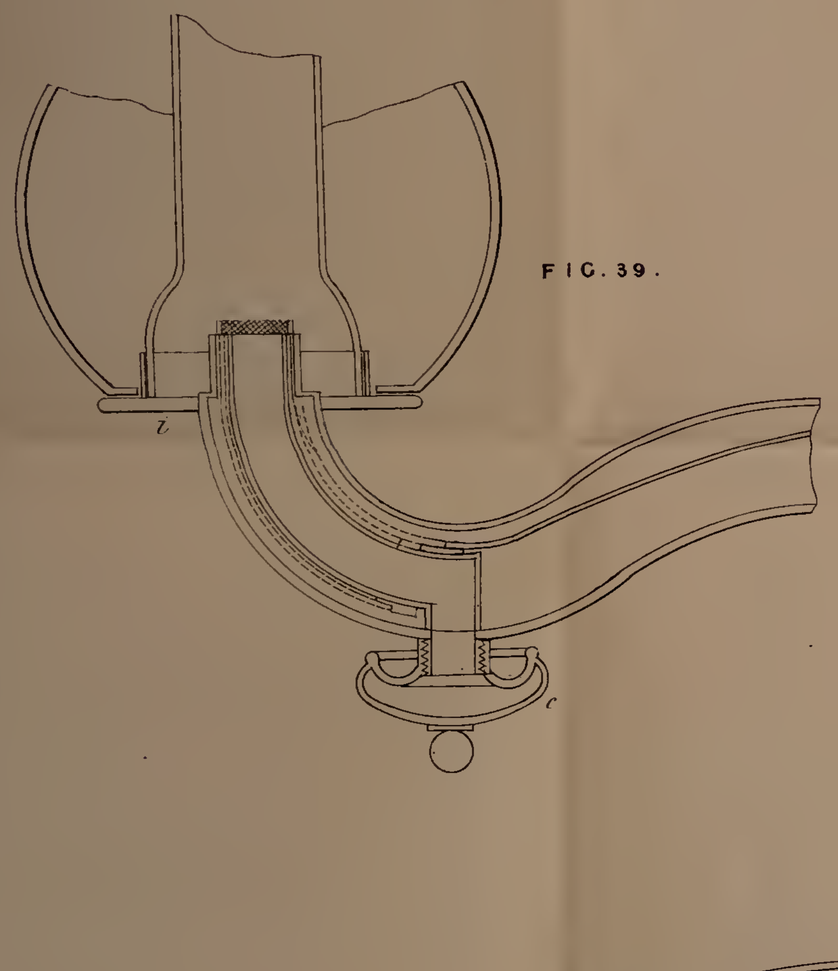


FIG. 39.

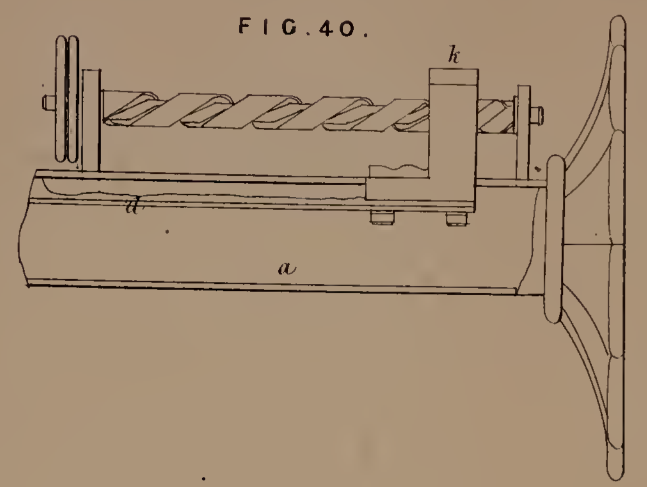


FIG. 40.

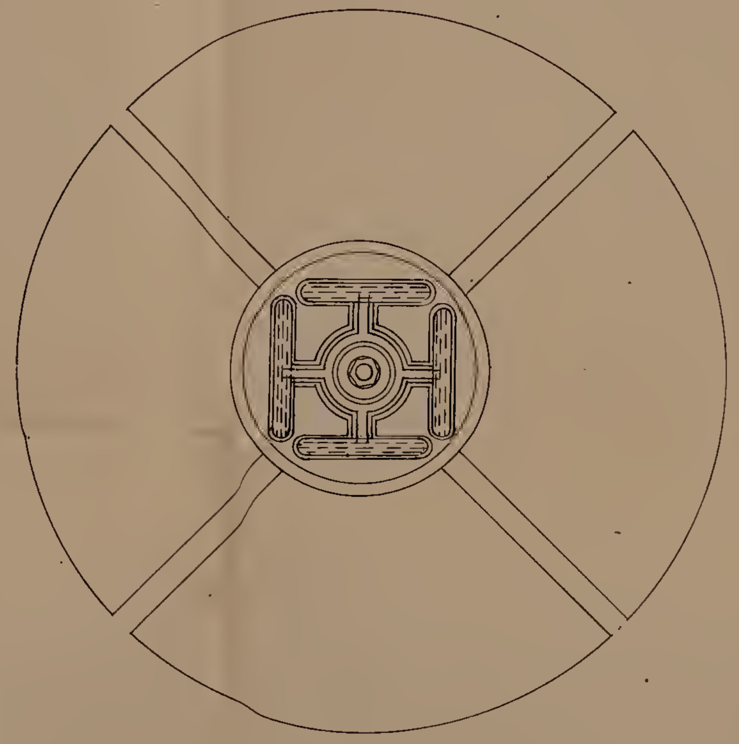


FIG. 34.

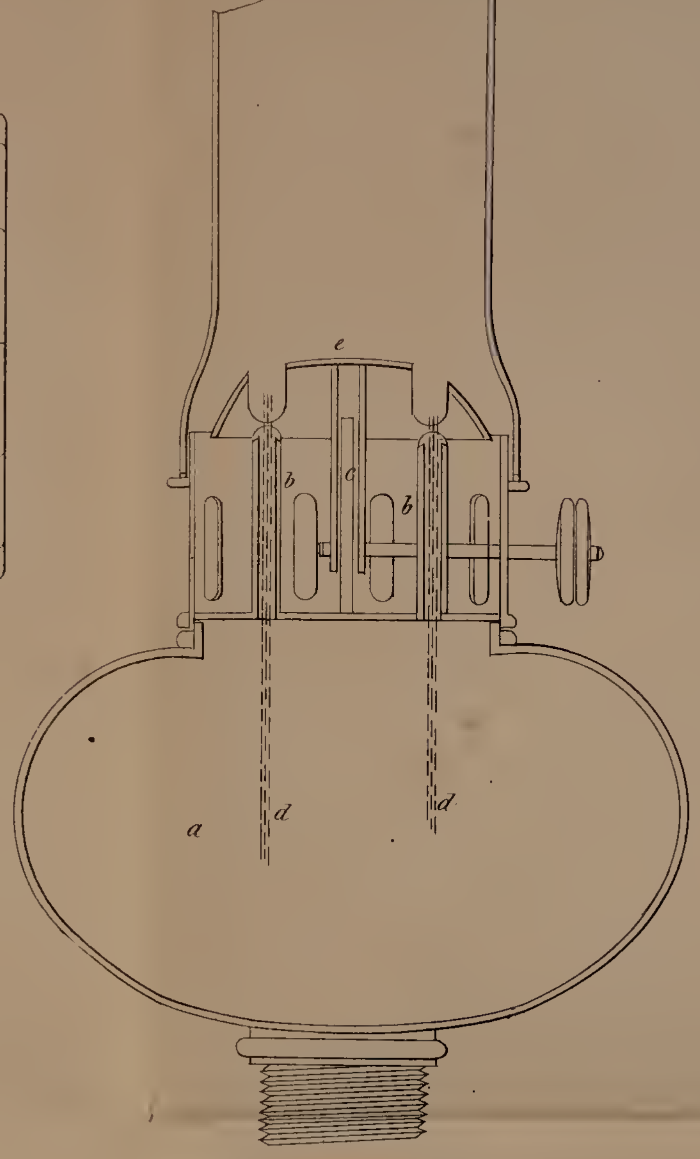


FIG. 45.

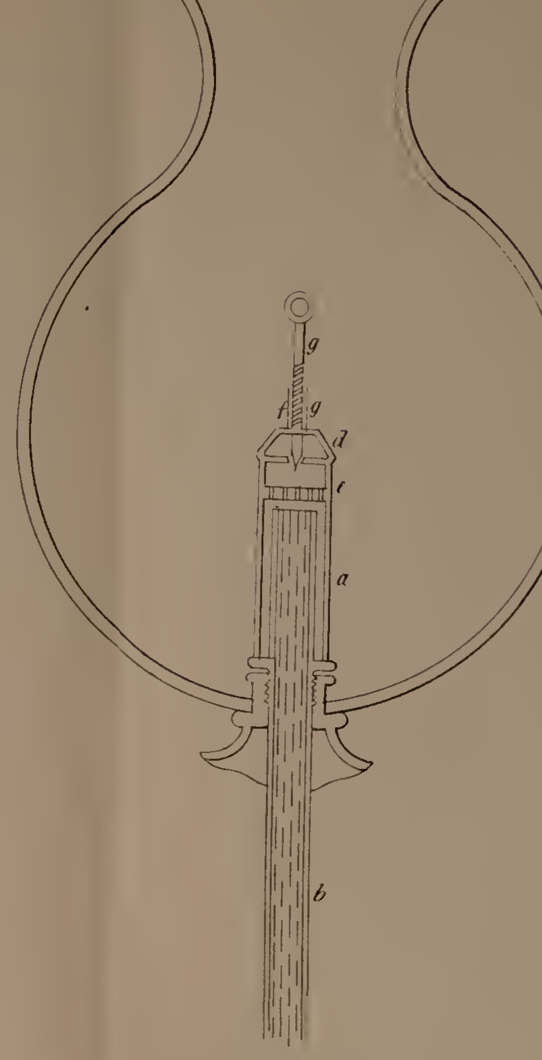
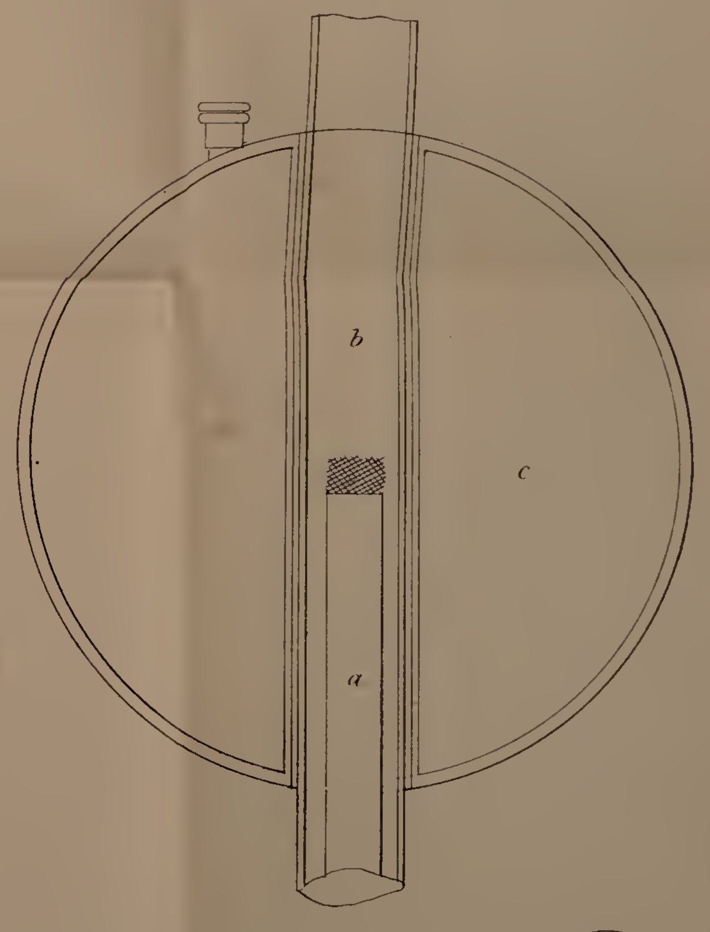


FIG. 43.



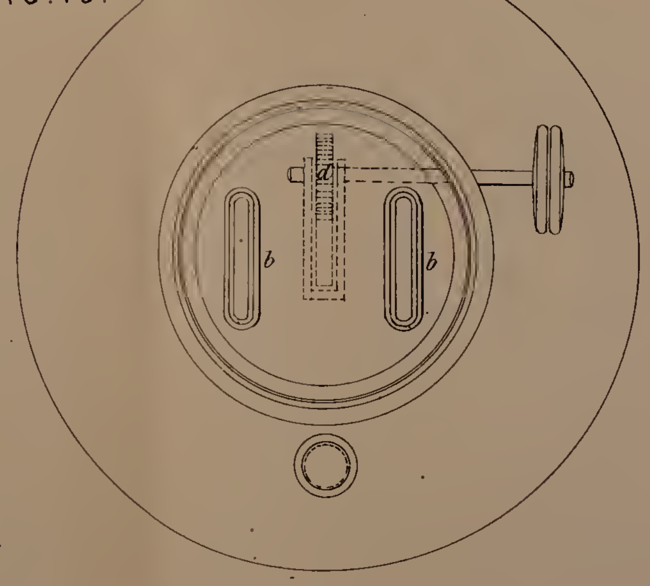


FIG. 46.

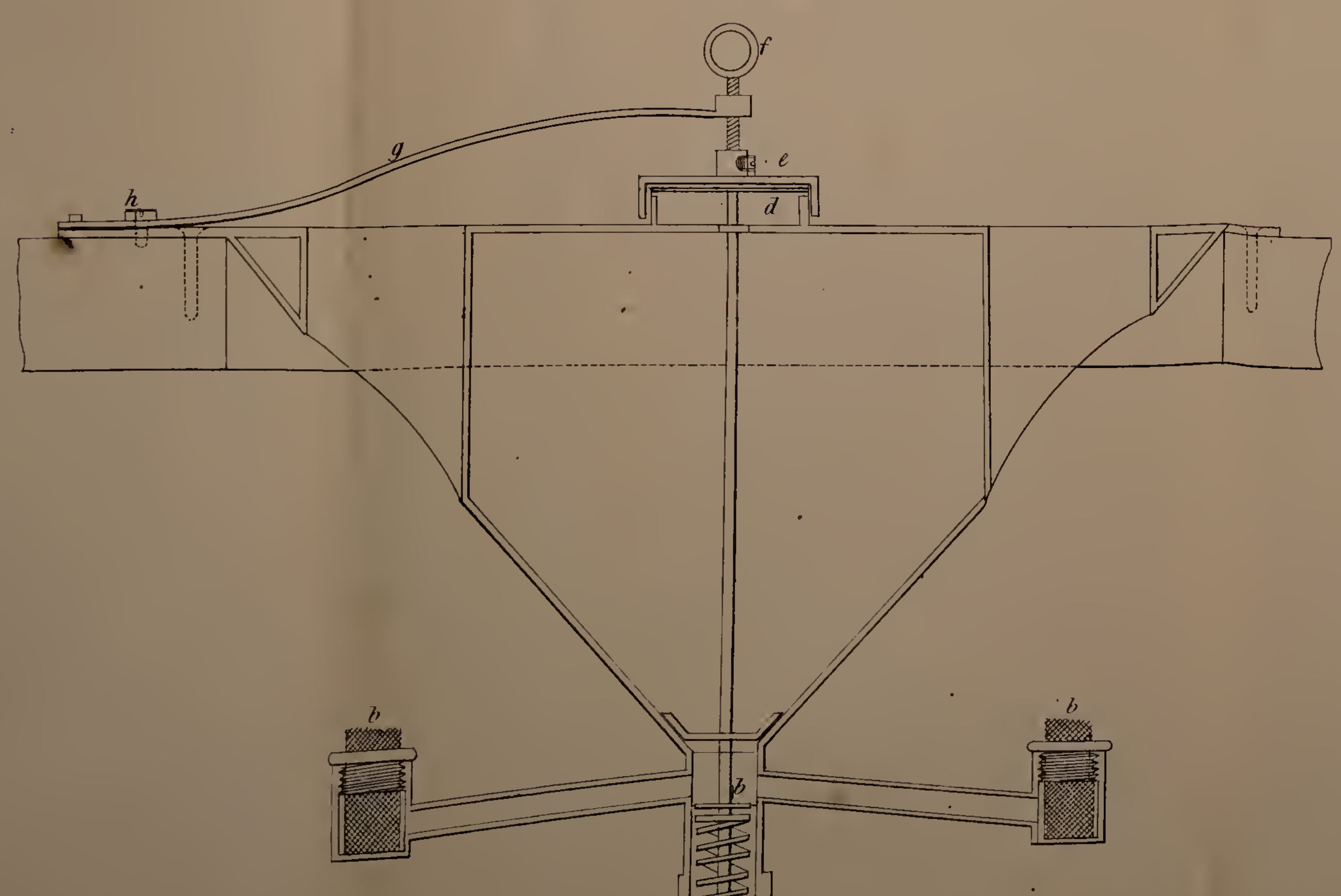


FIG. 35.

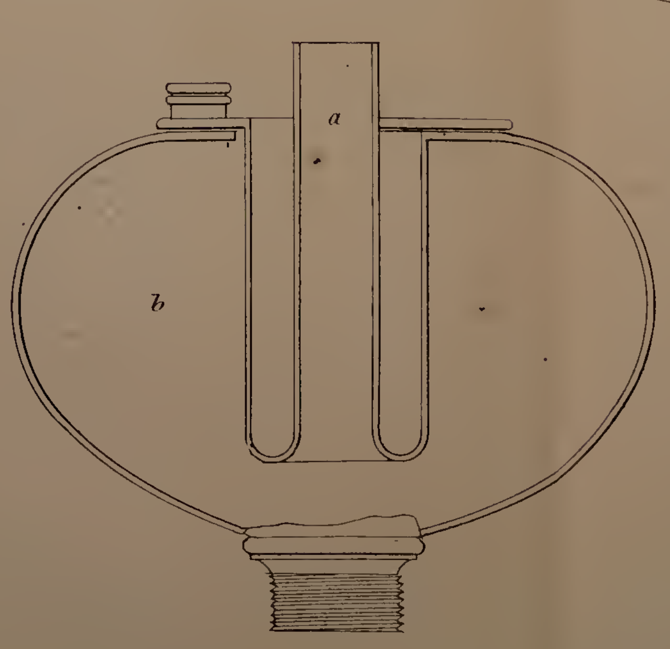
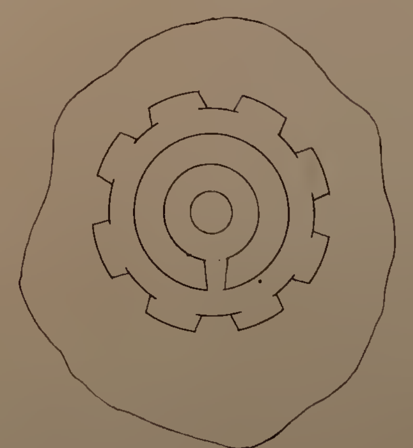


FIG. 44.



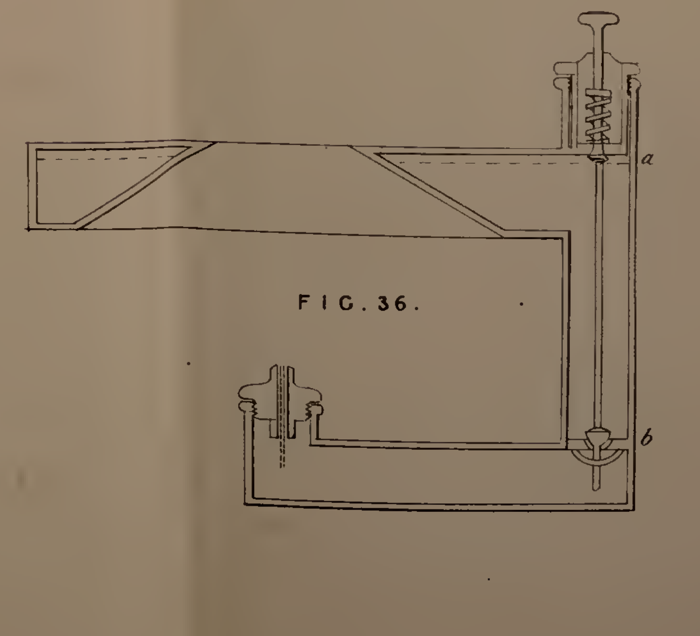


FIG. 36.

*The enrolled drawing is not colored.*

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FIG. 51.

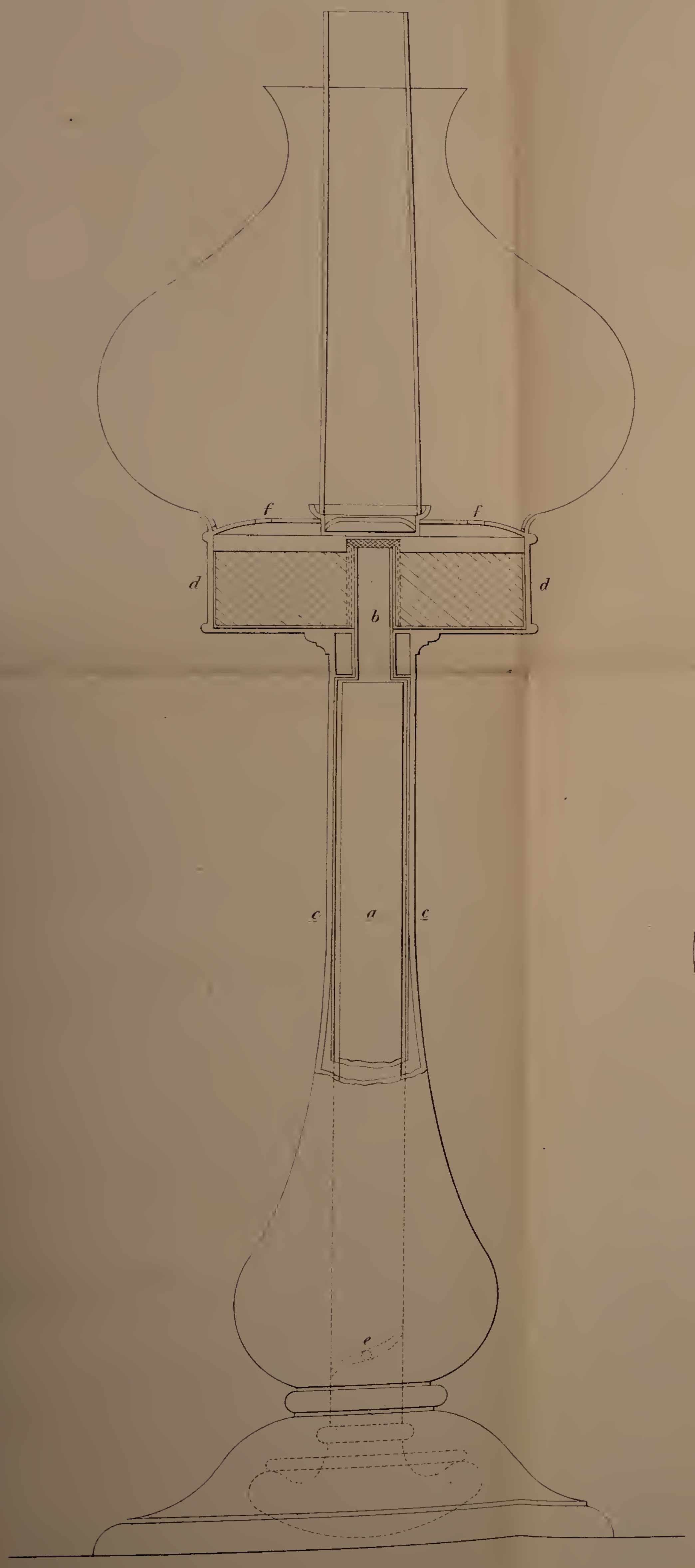
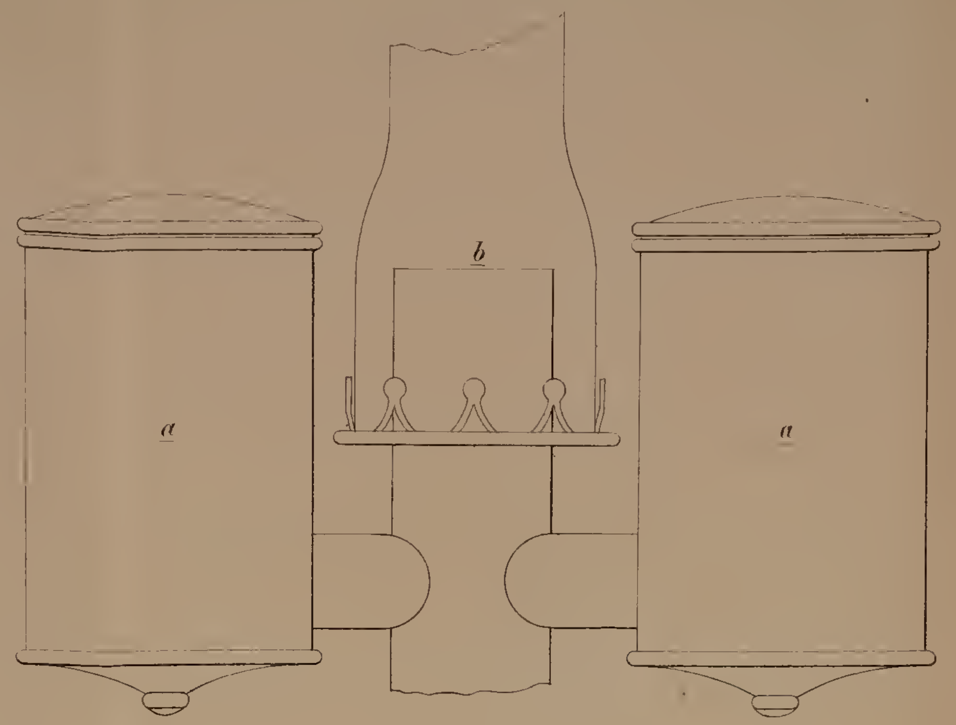


FIG. 41.



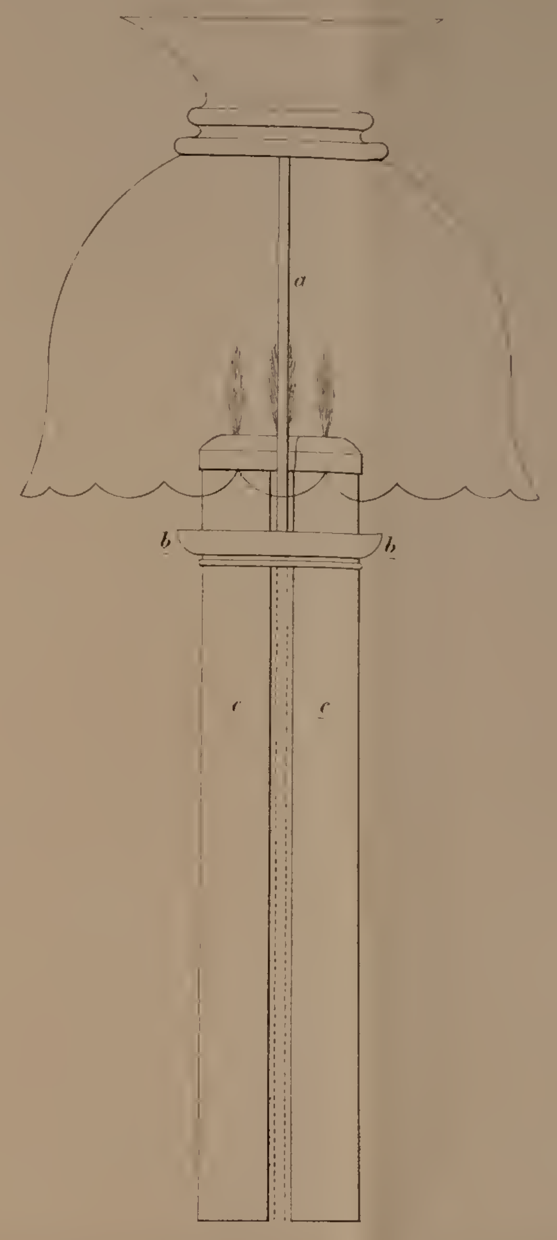


FIG. 57.

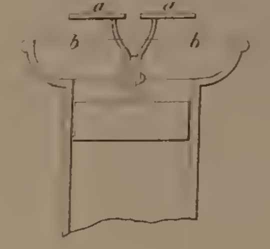


FIG. 54.

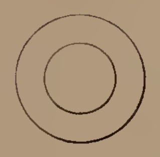


FIG. 42.

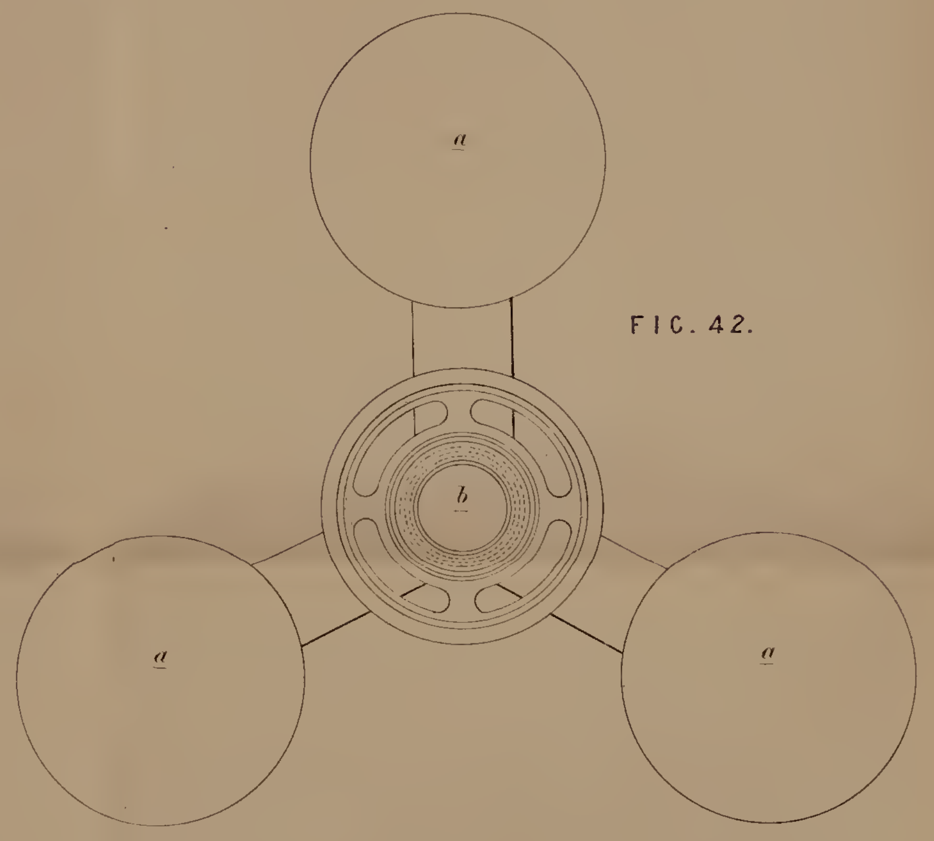


FIG. 56

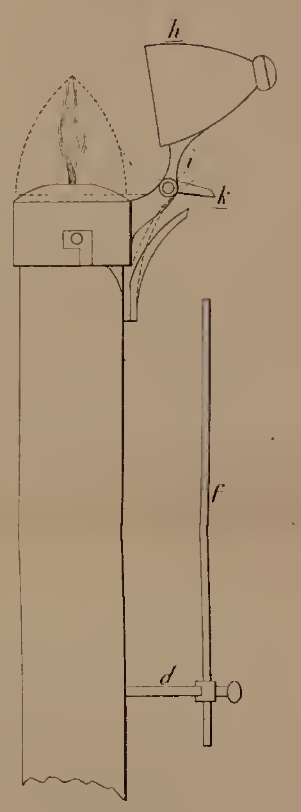


FIG. 58.

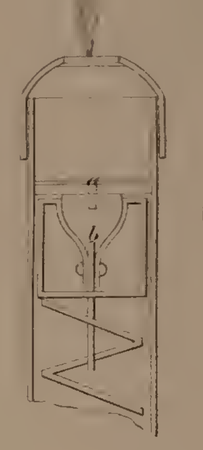


FIG. 52.

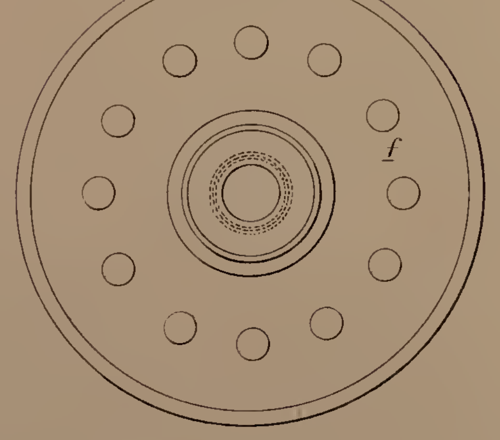


FIG. 49.

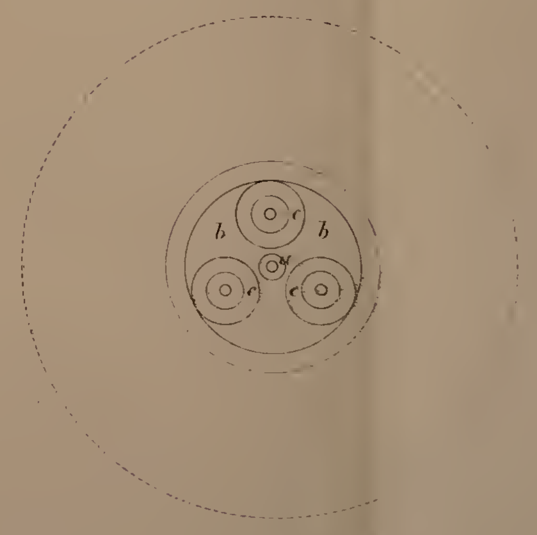


FIG. 59.

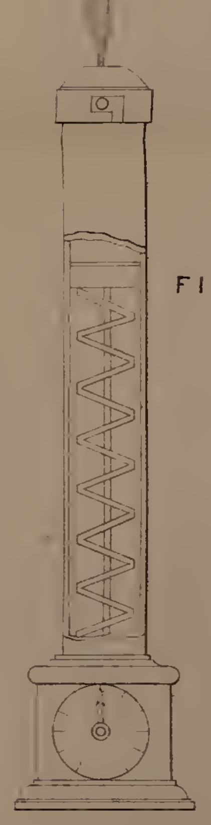


FIG. 53.

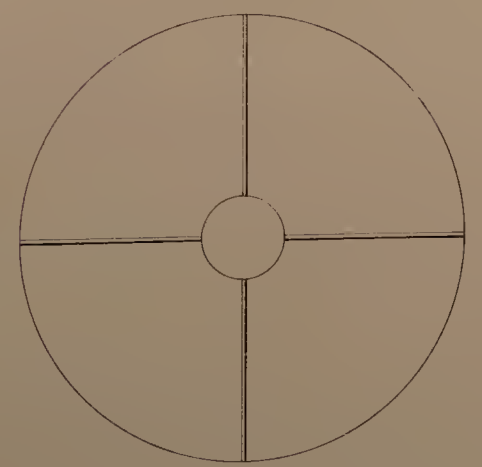


FIG. 55.

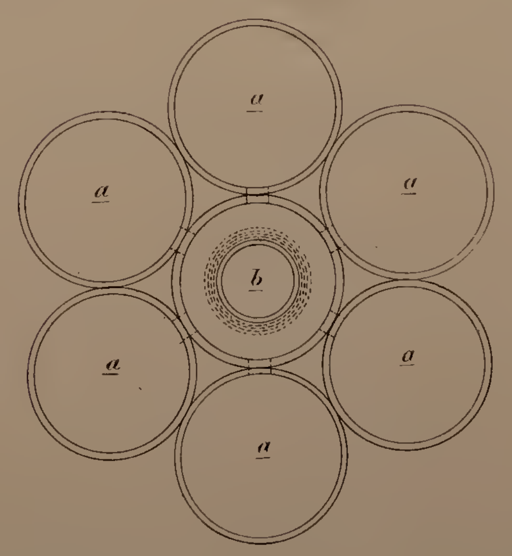
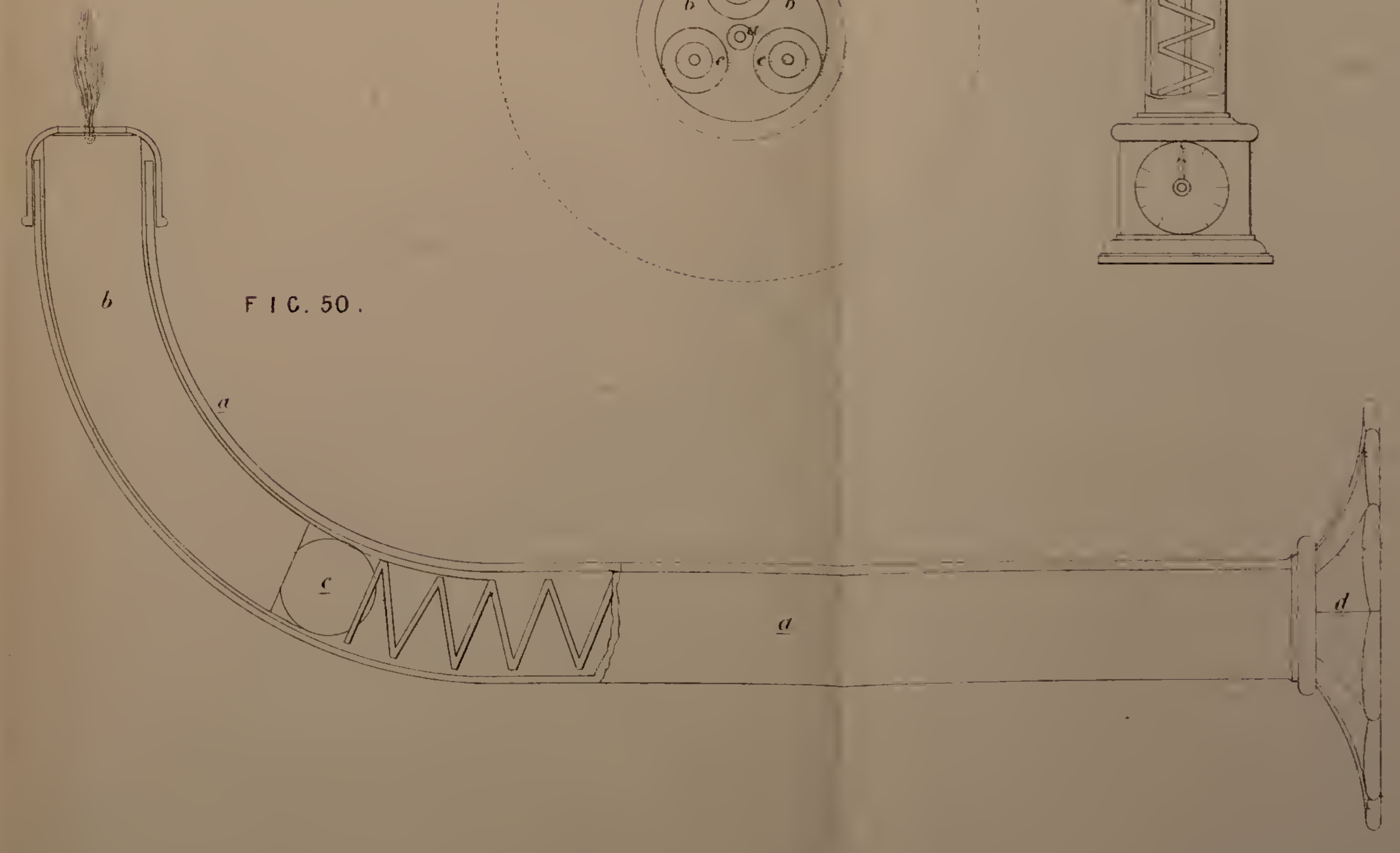


FIG. 50.



*The enrolled drawing is partly colored.*

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a large frame: corresponding half moulds upon a similar frame are placed above the former ones and moved along a tramway under the compressing power. This will have the effect of forming the candles to the moulds, and firmly compressing the folds of tallow together; after this operation the frames would be moved away in a contrary direction, and its place supplied with other frames, containing another series of candles. I obtain by this improved mode of manufacture, candles of a much firmer and solid texture than by the usual method.

Having now described the nature of my Inventions, and the mode of carrying them into effect, I wish it to be understood that I do not strictly confine myself to the exact details herein-before described, as many of them may be varied without departing from the principle of my Invention; but what I claim is, firstly, the construction and arrangement of ventilators herein-before shewn and described for ventilating buildings. Secondly, the construction herein-before described, of ventilators or chimney-tops, and their application for ventilating chimneys. Thirdly, the construction of portable and other stoves, heated by the combustion of oil or gas, and their application to heating buildings; also the combination of such stoves with reflectors for the purpose of heating and lighting apartments, as herein-before described. Fourthly, the application to ordinary grates and stoves of the perforated cone for the purpose of effecting a better combustion of the fuel therein, as herein-before described. Fifthly, the construction of argand burners for the combustion of gas, and the means of preventing the oxydation of the same by coating with tin or zinc, by galvanic or other process, as herein-before described. Sixthly, the modes described of regulating the access of the air to gas burners, as herein-before described. Seventhly, the modes described of constructing gas burners known as fish-tail gas burners. Eighthly, the several modes shown and described of constructing regulators, and their application to gas apparatus for the purpose of regulating and equalizing the passage of the gas. Ninthly, the construction of pendent sliding gas lamps, and their application to gas apparatus for the purposes described. Tenthly, the several modifications and constructions of oil pendant lamps and burners, herein-before described, and for the purposes herein-before described. Eleventhly, the several modifications, arrangements, and constructions of oil body lamps, shown and described. Twelfthly, the modes described of constructing railway carriage lamps. Thirteenthly, the several modifications, arrangements, and constructions of spirit and vapour lamps, and parts of spirit and vapour lamps, as described. Fourteenthly, the construction of syphon exhausting apparatus, and its application to gas and oil lamps and burners, for the purposes herein-before described. Fifteenthly, the construction of illuminators and signals for the purposes herein-before described. Sixteenthly, the construction of candle lamps, and parts of candle lamps, and their application for the purposes herein-before described. Seventeenthly, the mode herein-before described of illuminating marine floating buoys. Eighteenthly, the mode herein-before described of coating or covering metallic bodies to be employed as reflectors. Nineteenthly, the burning of hydrocarbon in contact with oil flames. Twentiethly, the mode herein-before described of manufacturing candles.

In witness whereof, I, the said William Crane Wilkins, have hereunto set my hand and seal, this Eleventh day of September, One thousand eight hundred and fifty.

WILLIAM CRANE (L.S.) WILKINS.

Signed, sealed, and delivered in the presence of

JAMES MASH.

Enrolled the Eleventh day of September, in the year of our Lord One thousand eight hundred and fifty.

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Wellcome [illegible]
for the [illegible]
and [illegible]
[illegible]